This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

LANE MEDICAL LIBRARY STANFORD
2 45 0289 6117

AV E. STECHERT
0 Broadway
W-YORK.

LANE

MEDICAL LIBRARY

LEVI COOPER LANE FUND

B

MEDICAL HISTORY.

ABERDEEN UNIVERSITY PRESS.

THE EARLIEST KNOWN PHYSICIAN (see pp. 14, 24).

MEDICAL HISTORY

FROM THE

EARLIEST TIMES

A POPULAR HISTORY OF THE HEALING ART

BY

EDWARD THEODORE WITHINGTON, M.A., M.B., OXON.

WITH TWO ILLUSTRATIONS

LANE MEDICAL LIBRARY
17628
SAN FRANCISCO

LONDON
THE SCIENTIFIC PRESS, LIMITED
428 STRAND, W.C.
MDCCCXCIV

B

"Many heroes lived before Agamemnon."

—HORACE.

"But we boast ourselves to be far better men than our fathers."

—HOMER.

W82
1899

PREFACE.

THE following book comprises a history of medicine and the medical profession from the earliest times to the beginning of the present century, and is published in the hope that it may form a not unwelcome contribution to a neglected department of medical literature.

The writer owes much to the standard histories and monographs of his subject, debts which will be duly acknowledged; but he has, in every case, gone also to the original authorities, and has attempted, so far as possible, to make the representative physicians of various ages describe their theories and practice in their own words, especially through illustrative "cases" recorded by themselves. In order to combine this with the brevity demanded in such a work, matters which may be found in ordinary books of reference, or readily accessible translations, are passed over as lightly as possible, and, with few exceptions, only those practitioners are introduced who may be said to have had some definite influence on the progress of medicine. Similarly less space has been devoted to Harvey, Sydenham, Hunter, and others, whose work has been fully and frequently described by abler hands, than to the Arabic and mediæval physicians, who are usually discussed more briefly than their historical importance seems to demand.

The writer is responsible for all translations not otherwise attributed, and he has endeavoured, in each case, to give the full meaning of the original, while omitting unnecessary verbiage. In nomenclature the greatest possible simplicity has been aimed at. "Christian" names are given in their English form; John Mesuë and Isaac ben Solomon being preferred to Yuhanna ibn Masawaih and Ishacq ibn Suleiman, though the latter may more nearly represent the mode in which those distinguished men were addressed by their contemporaries.

While appealing primarily to the medical profession and those connected therewith, it is hoped that the work may be not without interest to a wider circle, and everything has therefore been avoided which could reasonably render it unsuited to the family library.

E. T. W.

KINGSTON-ON-THAMES,
June, 1894.

CONTENTS.

Chap.		Page
I.	Introductory,	1
II.	Medicine in Prehistoric Times,	6
III.	Medicine as practised by Uncivilised Man,	10
IV.	Medicine in Ancient Egypt,	14
V.	Hindu Medicine,	25
VI.	Chaldean and Persian Medicine,	34
VII.	The Earliest Greek Medicine,	37
VIII.	The Philosophers—Democedes—The Asclepiadæ,	42
IX.	Hippocrates,	47
X.	The Schools of Cos and Cnidus,	52
XI.	The Successors of Hippocrates—The Dogmatic School,	57
XII.	The Alexandrine Anatomists,	61
XIII.	Heraclides and the Empiric School,	66
XIV.	Military Medicine in Ancient Greece,	70
XV.	The Medical Profession in Ancient Greece,	74
XVI.	Early Roman Medicine,	80
XVII.	The Methodic School,	85
XVIII.	Celsus and Ancient Surgery,	90
XIX.	Galen,	95
XX.	Galen and Hippocrates compared,	100
XXI.	The Medical Profession in Rome,	104
XXII.	Official Medicine in Ancient Rome,	109
XXIII.	Roman Military Medicine,	115
XXIV.	The Influence of Christianity on Medicine,	119
XXV.	Nestorian Medical Schools,	124
XXVI.	The Eclectics and Compilers,	127
XXVII.	Byzantine Medicine,	133
XXVIII.	Arabic Medicine (1): The Translators,	138
XXIX.	Arabic Medicine (2): The Eastern Caliphate,	144
XXX.	Arabic Medicine (3): The Western Caliphate,	154
XXXI.	Arabic Medicine (4): Hospitals and Institutions,	163
XXXII.	General Survey of Arabic Medicine,	170
XXXIII.	The Darkest Age,	175
XXXIV.	The School of Salerno,	184
XXXV.	The Ladies of Salerno,	191
XXXVI.	The Arabo-Scholastic Revival (1): Medicine,	196
XXXVII.	The Arabo-Scholastic Revival (2): Surgery,	207

XXXVIII. The Close of the Middle Ages, - - - - - - - 215
XXXIX. Mediæval Military Medicine, - - - - - - - - 221
XL. The Mediæval Physician, - - - - - - - - 225
XLI. The Medical Profession in the Middle Ages, - - - - 233
XLII. Unprofessional Medicine in the Middle Ages, - - - - 239
XLIII. The Revival of Learning, - - - - - - - - 245
XLIV. The Mystics, - - - - - - - - - - - 250
XLV. Paracelsus, - - - - - - - - - - - 254
XLVI. Paracelsus (continued), - - - - - - - - 261
XLVII. Similars, Sympathy and Signatures, - - - - - 266
XLVIII. The Great Anatomists, - - - - - - - - 273
XLIX. The Reform of Surgery, - - - - - - - - 281
L. Medical Practice in the Sixteenth Century, - - - - 289
LI. Harvey and the New Physiology, - - - - - - 298
LII. Van Helmont, - - - - - - - - - - 303
LIII. The Chemical School of Medicine, - - - - - - 309
LIV. The Iatro-Mechanical School, - - - - - - 314
LV. The Clinicians, - - - - - - - - - - 319
LVI. Seventeenth Century Surgery, - - - - - - 329
LVII. The Animists, - - - - - - - - - - 333
LVIII. The Vitalists, - - - - - - - - - - 338
LIX. The Organicists, - - - - - - - - - - 342
LX. The Surgery of the Eighteenth Century, - - - - 347
LXI. The Brunonian System, - - - - - - - - 351
LXII. The Origin of Modern Medicine, - - - - - - 356

APPENDIX.

I. The Medicine of China and Japan, - - - - - 363
II. The Asclepiadæ and the Priests of Æsculapius, - - - 370
III. Mediæval Monastic Medicine, - - - - - - 379
IV. The "Galenic" System of Medicine, - - - - - 386
V. English Medical Practitioners before Linacre, - - - 396
VI. Ancient and Mediæval Medical Prescriptions, - - - 406
VII. The Alleged Vivisection of Men in the Sixteenth Century, - 410

LANE MEDICAL LIBRARY
STANFORD UNIVERSITY
MEDICAL CENTER
STANFORD, CALIF. 94305

MEDICAL HISTORY.

I.—INTRODUCTORY.

DR. OLIVER WENDELL HOLMES, in one of his addresses, urges his hearers not to look with contempt on their old medical books: "The *débris* of broken systems and exploded dogmas," he continues, "form a great mound, a Monte Testaccio of the shards and remnants of old vessels which once held human beliefs. If you take the trouble to climb to the top of it, you will widen your horizon, and in these days of specialised knowledge your horizon is not likely to be any too wide." Now that the period of purely professional education has been prolonged, the tendency to this narrowness of view is likely to increase, and no better antidote could possibly be found than the study of medical history, a subject which makes us acquainted with the most diverse forms of thought, and brings before us every phase of civilisation. The neglect of this study, especially in England, has often been noticed, and seems due to two causes; first, that those who might write histories of medicine are more practically employed,—some, perhaps, in the nobler task of making history,—secondly and chiefly, that there is no demand for such works. The power and originality of modern medicine, the vigour and success with which it has opposed the scientific methods of observation and experiment to the old reverence for system and authority, tend to create a contempt for medical history, and a half-confessed feeling that we are the men, and knowledge was born with us, or at least with our fathers.

But the study has other advantages besides that of counter-

acting the narrowness of specialism; it will also help to preserve us from two opposite errors, excessive trust in authority, and over-eagerness to adopt anything which seems to be new and original. If we may no longer assert with Hippocrates that new discoveries can only be made by following out old tracks, medical history will at least warn us from paths which lead nowhere, or but to barren deserts of speculation; and though we shall meet with quacks, charlatans, and other relatives of that brisk lad, Ignorance, who came from the land of Conceit, we shall more often become acquainted with men whose characters we may well emulate, whose lives were devoted to the benefit of their fellows, and to a noble even if fruitless search for Truth. Nor is this study to be commended to the medical profession only, but to educated men in general, and that quite apart from its claims as an important and interesting section of the history of human development. Many who are too apt, when in health, to cast unmerited reproach and ridicule upon medical science, and too ready, when health fails, to run after every new "system" or fresh form of quackery, would thus learn something of the nature of medical problems. They would become acquainted with the vast difficulties against which medicine has had to contend; with the labours of those great men who have by slow degrees advanced the bounds of knowledge; in short, to quote once more our medical poet, with the history of "a noble profession, which for more than two thousand years has devoted itself to the pursuit of the best earthly interests of mankind, always assailed and insulted from without by such as are ignorant of its infinite perplexities and labours, always striving in unequal contest with the hundred-armed giant who walks in the noonday, and sleeps not in the midnight, yet still toiling, not merely for itself and the present moment, but for the race and for the future".

An attempt will be made in ensuing chapters to take a brief survey of medical history, giving special prominence to those parts of it which teach such lessons as are above

indicated. The subject may be conveniently divided into three periods, of which the first may be called the instinctive, empiric, or, from its characteristic theory of disease, the demonic epoch of medicine. Under this head we shall consider the earliest forms of the healing art, supplementing our scanty knowledge of prehistoric medicine by what is known of its practice among uncivilised races. The medicine of the ancient East, and its early developments in Greece, will be classed here, though in Egypt and India especially we shall find ample evidence of a much higher stage of knowledge.

The great name of Hippocrates introduces a new era, that of Greek medicine, which forms the second and most extensive division of our subject. After tracing the origin of clinical observation to this great reformer, and of anatomy and physiology to the fostering care of the Greek kings of Egypt, we shall see how the followers of Hippocrates, like those of his contemporary, Socrates, split up into a number of sects or schools, some of which entirely renounced his authority. Three of these sects, the Dogmatic, the Empiric, and the Methodic, will attract our special attention, and we shall find them in the second century, A.D., producing their three greatest representatives, Galen, Sextus Empiricus, and Soranus the Methodist. We shall notice how the elaborate system of Galen, while eclipsing all the other schools, was itself obscured for a time by those vast revolutions in European history due to the triumph of Christianity, the invasion of the barbarians, and the separation of the eastern and western divisions of the Roman empire. In the dark ages which followed, the study of Greek medicine was taken up by another branch of the human family, and in the West at least was for a time classed among those *studia Saracenorum*, or Arabic studies, which were held to be closely allied to necromancy, and fraught with danger to the souls of the orthodox. Soon, however, in the story of the school of Salerno, we shall find Greek medicine returning to the West under Arab influences, somewhat modified in form, enriched with a larger armoury of drugs, and provided with

a new attendant science in the infant chemistry. We shall next see how, at the revival of learning, this Græco-Arabic medicine came into collision with its genuine Greek original, and how the vast fabric of Galenism, thus divided against itself, and attacked from without by the new school of anatomists, and by free spirits such as Paracelsus, finally gave place to a new epoch. For two thousand years Greek medicine had ruled supreme, and though we can now afford to despise its humoral pathology, we shall, I think, find that even Galenism was superior to many of the systems it supplanted, and to some which have succeeded it, and that the Greek medicine as a whole was not unworthy of that wonderful people who gave it origin.

Our third period dates from the rise of a physiology founded no longer on speculation but on fact, and begins with that great discovery which has given the name of Harvey an immortality of reputation. But it was the betrothal rather than the marriage of Medicine and Science which was then celebrated. Chemistry, physics, physiology were still too young to take their proper position as helpmates to the healing art, and the attempt to hasten the union by seizing upon isolated sciences or scientific theories gave birth to a new set of schools and systems, chemical, mechanical, vitalistic, presenting many curious analogies to the old Greek ones. Happily their duration was shorter; great men continued the work of Harvey, and, at the beginning of the present century, medicine under Bichat and Laennec became, at least in some of its departments, scientific; systems, with one exception—homœopathy—disappeared, and medicine, like all other sciences, entered upon a period of unparalleled progress.

A brief list of the principal works to which the writer is indebted, and which may be consulted by those who wish to pursue the subject, will follow each chapter, and a short account of the most important general histories of medicine may appropriately be given here. In this, as in other departments of historical research, Germany is pre-eminent.

The Latin work of Schulze (1728) prepared the way for Sprengel's epoch-making *Attempt towards a Pragmatic History of Medicine* (5 vols., 1792-99), which was translated into French and Italian and has formed the basis of most later books on the subject. But even this great work has been surpassed by Haeser's *Text-book of the History of Medicine and Epidemic Diseases* (3 vols., 1879-82, 3rd edition), a monument of German industry and research which must long remain the standard authority. Besides these we may mention the brilliant *History of Medicine* by Hecker (incomplete, 1822-29), better known as the historian of mediæval epidemics, and the later works of Wunderlich (1859), Baas (1876), and Puschmann (1889), the two latter of which have been translated into English (Philadelphia 1889, and London, 1891). The most important French books on the subject are Le Clerc's *History of Medicine* (1696, incomplete), Daremberg's *History of the Medical Sciences* (2 vols., 1870) and Bouchut's *History of Medicine* (2 vols., 1873). In Italy medicine has found a worthy historian in Puccinotti (3 vols., 1850), and England alone among the nations distinguished by their contributions to the art has produced no complete work of importance dealing with its history. A good beginning, indeed, was made by Freind's continuation of Le Clerc's history from the time of Galen to the sixteenth century, and Adams' edition of *Paulus Ægineta*, which practically includes a history of ancient medicine, gained for its author a European reputation. Books on medical biography, too, are numerous and excellent, and among them Dr. Greenhill's articles on the Greek physicians in the *Dictionary of Classical Biography*, and Dr. Richardson's accounts of modern practitioners in his *Asclepiad*, may be specially noticed. There are also several short histories, mostly founded upon Sprengel, which have appeared in groups, at intervals of thirty years, such as those of Hamilton (1831) and Bostock (1834), Meryon (incomplete) and Russell (homœopathic), both published 1861; while since 1889 we have had the two translations above mentioned, and a

popular History of Medicine by Dr. Berdoe. The *Encyclopædia Britannica* contains an excellent condensation of Haeser's work by Dr. Payne, but an English History of Medicine which may compare even with the least of the continental histories above noticed has yet to be written.

II.—MEDICINE IN PREHISTORIC TIMES.

EVER since vital activity has existed on the earth, it has, in all probability, been liable to those perturbations which we call disease; wounds and injuries must have occurred wherever there were weapons to inflict them, and fragments of diseased fossil bone are to be found in our museums.[1] We may well suppose that the earliest efforts of intelligent beings were directed towards the avoidance or cure of these disorders, and the older writers amused themselves by searching for instances of medical or surgical practice which they thought might be derived from animals. Thus the most ancient and widely spread of surgical operations, that of bleeding, is said to have been taught mankind by the hippopotamus. "That intelligent animal," says Pliny, "finding himself plethoric, goes out on the banks of the Nile, and there searches about for a sharp-pointed reed, which he runs into a vein in his leg, and having thus got rid of a sufficient amount of blood, closes the wound with clay." Similarly the use of emetics is said to have been learnt from the dog, that of hellebore from the goat, while the assertion that stags healed their wounds by means of the herb dittany is supported by many authorities, including Aristotle himself. Nor are these stories to be entirely rejected, for have we not lately been told that Count Mattei discovered the basis of his alleged remedies by observing the plants eaten by a mangy dog in the Apennines?

But we are not altogether without indications of a more scientific kind as to the nature of prehistoric medicine, apart

from its probable resemblance to the practice of the healing art by barbarous races. Thus philologists assert that among popular medical terms, those denoting affections of the skin are common to the greatest number of branches of the Aryan race, from which we may, perhaps, conclude that such diseases were especially prominent among our uncivilised and not overcleanly ancestors in their earliest homes.[2] So, too, the discovery of cakes made of poppy seed in the ruins of the Swiss lake dwellings may indicate that opium, the most important of drugs, was also one of the earliest to be used by man.[3]

Particularly interesting is the evidence, recently brought forward, of the frequent performance in prehistoric times of the operation of trephining, or removal of a part of the skull vault. At a meeting of the French Association, held in Lyons, 1873, Dr. Prunières exhibited a disc of bone, excised from a human skull, which had been found under a dolmen in Lozère. In the following year he showed a number of similar discs, with accompanying skulls, in some of which signs of repair indicated that the patient had long survived the operation, though, in the majority, the bone must have been removed either shortly before death or *post mortem*. Attention was thus directed to the subject, and resulted in the collection of several hundred trephined skulls from prehistoric burial-places in France alone, upwards of sixty being found in one cave, while traces of a similar practice were discovered in countries so remote as Bohemia, Portugal, Peru, and Japan. The accompanying ornaments and weapons were usually those characteristic of the later stone or bronze age, and the operation seems to have been performed by means of flint implements in one of three ways, by sawing, by a chisel-like action, or by boring a series of holes close to one another. In some cases striæ and scratches round the wound betray a bungling operator, but many are done with much skill, considering the rudeness of the instruments.

The various explanations which have been given to

account for the frequency of the operation can only be briefly mentioned here. In one or two instances a diseased state of the bone indicates a therapeutic object, and the idea that the operation may have sometimes been performed for the cure of epileptic fits following an injury is supported in a recent paper on the subject by Professor Victor Horsley. But the theory most generally accepted is the one put forward by Broca. That celebrated anatomist and anthropologist noticed that in some cases more than one operation had been performed, one piece of bone having been removed long before death, and one or more others taken from the same skull *post mortem*, each including part of the healed margin of the old wound. On this he founded his theory that the operation was a sort of religious rite or initiation, the survivors of which acquired a special sanctity, so that, after death, parts of their skulls were sought as amulets, and became so valuable that they were often forged, not only from other human skulls, but from the bones of animals, for similar discs have been found manufactured from a stag's antlers. We might perhaps combine these two hypotheses, as, indeed, Broca himself afterwards suggested. Epilepsy is, of all diseases, the one most universally attributed to supernatural agencies, and the repeated cure of epileptiform attacks by means of trephining might, not impossibly, have invested the operation with the character of a religious rite, rendering those who underwent it especially proof against the assaults of evil spirits.

In the majority of cases the operation was performed on the young, and Broca supposes that, whenever a neolithic baby had fits, a hole was scraped in its head to let out the imaginary demon; if the fits ceased, and the child survived, it was ever afterwards looked upon with peculiar respect.

That the excised fragments of bone were used as amulets is indicated by many of them being perforated, and, in the fact that they are found in burial-places, Broca saw one of the earliest proofs of belief in a future state, and in a spiritual

world where protection against ghostly enemies might be no less necessary than here. Others have supposed that the object of the operation was to enable the spirit to escape from the body, or to facilitate its return, apertures, apparently for this purpose, having been found in many ancient burial mounds. It would thus be connected with the practice, not altogether extinct in modern England, of throwing open the windows of a room where death has recently occurred with the view of favouring the exit of the departed spirit. The discs of bone, it is suggested, might have been worn, not so much as charms against demons as in the hope of acquiring the former possessor's wisdom and cunning, just as a modern savage eats his enemy's heart in order to get his courage.

It is important to notice that a very similar custom still exists in the South Sea. In the Island of Uvea, for example, headache and other cerebral disorders are attributed to a crack in the skull or to pressure on the brain, and the recognised treatment is to scrape a hole through the bone near the top of the head. The implement formerly used was a shark's tooth, but since the advent of civilisation broken glass has been substituted. The mortality is about one in two, and few of those who recover are relieved of their symptoms; but such is the force of custom, that there are said to be few adult males on the island who have not undergone the operation. The process is said to last over an hour, and one hardly knows whether to admire more the endurance of the patient, or the boldness and perseverance of the operator.[4]

NOTES.

[1] Signs of disease and injury are met with in fossil remains of the early periods, but the cases of greatest interest are those collected by Prof. Schmerling of Liège from the caves of Belgium. He found that caries of the bones of the lower jaw and fore-legs was very common, probably as the result of bites or other injuries; but he also describes a case of anchylosis of the cervical vertebræ, and a lumbar vertebra which was nearly destroyed by disease before the animal died. The cave

bear, like the animals in our modern zoological gardens, seems to have been very liable to rickets, and in some cases its joints present the characteristic deformities of rheumatoid arthritis (*Ossements Fossiles*, vol. ii. 180).

[2] Schrader, *Sprachvergleichung und Urgeschichte*, 1883, p. 409.

[3] Keller, *The Lake-dwellings of Switzerland* (trans. 1878), p. 523.

[4] See Broca, *Sur la trepanation du crane et les amulets craniennes a l'epoque neolithique*, Paris, 1877; *Journal of the Anthropological Society*, vols. xi. and xvii.; Joly, *Man before Metals* (International Scientific Series); *Medical Times*, 1874, p. 50.

The dates of the works quoted here and elsewhere are those of the editions which I have consulted, not necessarily the first.

III.—MEDICINE AS PRACTISED BY UNCIVILISED MAN.

IT may be well to preface our survey of medical history by a brief glance at the practice of the art by barbarous races, for we shall thus not only obtain some idea of the probable character of primitive medicine, but shall also find traces of many beliefs and practices which have survived under modified form in civilised communities. Only the briefest sketch of this vast subject can be here attempted.

In striking contrast to that tendency to materialism not altogether unjustly attributed to modern medicine, savage theories of disease are typically spiritualistic. This seems to be due partly to the habit, common to savages and children, of attributing life to everything, partly to the inherent nature of the subject. Disease and death, whatever they are, affect the inmost being of man, and even the most degraded savage holds that his inmost being is spirit, not body. How can merely physical agencies affect a spirit? Why should a simple blow on the head drive the soul from the body? The question has puzzled one of the greatest of physicians. "If Plato were alive," writes Galen, "I should like to ask him why great losses of blood, a draught of hem-

lock, or a severe fever, should separate soul and body, for, according to Plato, death takes place when the soul removes herself from the body" (Kühns edit., iv. 775). If the savage does not perceive a difficulty, it is because he at once explains it by a supernatural theory of disease. Sometimes this theory is carried out to its fullest extent. Thus the Abipones hold that man is naturally immortal, and that even those killed in battle die not from their wounds, but from the enchantments of the hostile medicine men: if there were no medicine men, there would be no death. Even when the logic of facts has compelled the belief that clubs and arrows can kill without the aid of sorcery, faith in the spiritual origin of diseases remains unaltered. The supernatural agencies which cause them are, however, of the most varied kind. Thus we may distinguish (i.) independent disease demons; (ii.) human enemies, who may act either by means of spirits of disease, over whom they have acquired authority, or by their own supernatural powers; (iii.) the spirits of the dead; (iv.) the spirits of animals killed in hunting. The belief in diseases caused by a good but angry divinity, who is to be appeased by prayer and sacrifice, belongs to a different and higher stage of civilisation. For examples of these various forms of belief the reader must refer to other sources, but some of the customs founded upon them, which are of medico-historical interest, may be here considered.

The savage medicine man, who treats his patient on the excellent principle of removing the cause of the disease, has discovered at least three different methods of getting rid of a demon. First, the body of the patient may be rendered an unpleasant abode for the intruding spirit, and that in many ways. The sufferer may be vigorously squeezed and pommelled, beaten, starved, fumigated by evil-smelling substances, or be given nauseous medicines, which are especially useful if they act as emetics. To the first of these practices we may, perhaps, attribute the origin of that more systematic rubbing, undoubtedly of great antiquity, which has been re-introduced into scientific medicine under the name of

"massage". Of fumigation we find a typical instance in the Apocrypha, where Tobias frees his bride from a demon by fumigating her with a fish's heart and liver, "the which smell, when the evil spirit had smelled, he fled into the uttermost parts of Egypt". Nor is this unconnected with our present subject, for we shall find that the mediæval physician looked upon Tobias's angel guide as his especial guardian, and that many of his drugs were well calculated to produce effects similar to those of the famous fish liver. It is not impossible that the belief, so common among hospital patients, that a "strong" medicine must, of necessity, be a very nauseous one, may be traceable to a similar origin.

But there is another and a less unpleasant mode of expelling a demon; he may be provided with a more appropriate dwelling-place. Thus, in the Vedas, those most ancient monuments of Aryan literature, the demon of jaundice is entreated to depart into a yellow bird, and the chilly spirit of ague to take up his abode in the frog, while in later times the very sight of the golden oriole was considered sufficient to cure the former disease. We may be able to trace a relation between this form of the demonic theory, and the mediæval doctrine of "signatures," and shall perhaps find it not altogether unconnected with the still more famous medical dogma: "Likes are cured by likes".

Thirdly, there are persons endowed with power over the spirits of disease, who are able by charms and incantations to expel them from the patient's body, and in them we may not improbably see the first germ of the medical profession. It is usually asserted that the first physicians were priests; it would perhaps be equally true to say that the first priests were physicians. The savage appears to derive his ideas of higher existences, not so much from the starry heavens above, or the moral law within, as from those powers of nature which affect him physically, and especially from those which cause disease, and in his dealings with this spirit world, he looks primarily to those who, as he believes,

can prevent or cure disease; his priests, in short, are "medicine men".

But may not those who have acquired such power over the spirits of sickness cause diseases as well as cure them? This brings us to that belief in witchcraft, the universality and terrible results of which amongst uncivilised races, is one of the saddest revelations of modern anthropology. We cannot here do more than mention this important aspect of the demonic theory of disease, nor need we trace it to its modern development. It is no curious old belief dug up by antiquaries to interest the student, or amuse the "general reader," but beyond parallel the most terrible delusion which has ever afflicted mankind. Within one century in Christian Europe alone, it brought torture and death to many thousands of innocent beings, and the amount of physical and mental agony caused by the belief in witchcraft through the long ages of man's early development passes all human estimation.

That diseases are often ascribed to departed spirits is a fact familiar to all students of folk-lore, and we shall meet with a curious instance of it in discussing the practice of medicine in ancient Egypt.

The supposed disease-producing power of the spirits of animals affords the simplest explanation of one of the most extraordinary customs of uncivilised man, that of the "couvade," or of the husband's lying-in when his wife has a baby. This strange habit, first noticed by Diodorus and Strabo as occurring in Corsica and the Pyrenees, has been found by modern observers among primitive races in every quarter of the globe. That a mother and her new-born child are peculiarly exposed to the attacks of evil spirits is a very wide-spread belief, originating, perhaps, in their great liability to diseases, and we find that in some races the husband refrains from hunting altogether at these times, lest the spirits of the injured animals should attack the helpless infant. It seems not impossible that he might sometimes go a step further, and, finding himself debarred from his usual

occupation on these interesting occasions, conclude that he must in some way be seriously affected by the event, and proceed to treat himself accordingly.

NOTE.

It must not be supposed that the medicine of uncivilised man is exclusively "demonic". Most tribes possess such surgical skill as is required for the rough treatment of fractures and dislocations, while some also employ bleeding, cupping, and vapour baths. Not a few of the drugs in our modern pharmacopœia were first used by savages, as for example senega, lobelia, guaiacum, ipecacuanha, though unfortunately the numerous travellers' tales of wonderful remedies known to barbarous races have seldom survived investigation.

The above explanation of the "couvade," for which I am indebted to Dorman, *Origin of Primitive Superstitions* (Philadelphia, 1881), is not that usually accepted (see Lubbock, *Origin of Civilisation*, p. 17, and Tylor, *Early History of Mankind*, p. 293). When a Chinese baby is born its father's trousers are hung upside down in order that any stray demons may go into them and not into the child (Tylor, *Primitive Culture*, ii. 149). What the Dacotah Indian most dreads is that some animal's spirit will enter his body and make him sick. Toothache is attributed by the Dacotahs to the spirit of the woodpecker. An old Dacotah explained his son's sore eyes by the fact that thirty years before, when his son was a boy, he had speared a minnow with a pin on a stick, but he thought it strange that the fish's spirit should have waited so long for its revenge. In Brazil the chiefs act as physicians, and first ask their patients if they have injured any animal, tortoise, deer, etc. (*Dorman, op. cit.*). For diseases caused by departed spirits see Black, *Folk Medicine*, and for the whole subject Bartels, *Die Medicin der Naturvölker*, Leipzig, 1893.

IV.—MEDICINE IN ANCIENT EGYPT.

AMONG the "mastabas" or tombs of Egyptian grandees which surround the pyramids of Sakkarah is one, small and unpretending in appearance, but remarkable for the beauty and perfection of its inscription. This shows the tomb to be that of Sekhet'enanch, chief physician to the Pharaoh Sahura of the fifth dynasty (B.C. 3533?), and describes how

he had healed the king's "nostrils," for which his Majesty wishes him "a long life in holiness". "Then the chief physician spoke before Pharaoh: 'May it please thy soul beloved of Ra, that there be given me a limestone slab like a door for this my tomb in the West-land'. Then the king commanded, and they brought unto him two stone slabs like a double door from the quarry Ro'an, and they were set up in the court of his palace Chaurert-Sahura. The chief taskmaster made the temple masons inscribe them as for the king himself. The Court visited them daily. His Majesty ordered the inscription to be done over with blue-stone."[1] This appears to be the first mention of a physician in history; for, though the older Egyptian dates are uncer-tain—that given above being the one accepted by Brugsch and the British Museum authorities—few modern Egypto-logists would place the fifth dynasty later than B.C. 3000, and we may safely assert that the interval between Sekhet'-enanch and Hippocrates was at least as great as that which separates the "Father of Medicine" from our own day. Physicians, as a class, are referred to in still more ancient inscriptions under the term "snu," a word represented hieroglyphically by what seem to be a lancet and cupping instrument.

Who were these first practitioners of what may be called civilised medicine? The generally accepted theory is that all early physicians, and especially the Egyptian, were priests; but, though in later times the practice of medicine in Egypt was undoubtedly confined to the sacerdotal class, this was by no means necessarily the case at the period now under consideration. Society had then a more patriarchal character; every one was in some sense a priest, the judges of the Goddess of Truth, the officials of the god specially worshipped by the reigning Pharaoh, and the physicians of Sekhet, the lion-headed Goddess of War, to whom in these earliest ages the origin of medicine was attributed;[2] but their civil offices were always the most prominent, and there was in addition a separate sacerdotal class to whom the

highest and lowest religious functions were entrusted. The disappearance of the "lay element" and the development of this sacerdotal class till it absorbed the professions of scribe, judge, and physician, and finally invaded the throne itself, form the keynote of Egyptian history. The Egyptian physician as met with in Greek writers is primarily a priest, but his special divinity is no longer the war goddess, but Thoth, the God of Wisdom and Writing;[3] he has thrown away his lancet and cupping-horn, and abhors bleeding, for do not the sacred writings declare that the blood is the life? And these writings he must follow in all things, for, should a patient die after treatment not in harmony with them, his own life may pay the penalty.

Returning to the freer times of the old empire, we must travel far down the ages after Sahura before meeting with another interesting relic of Egyptian medicine. This is the domestic medicine chest of the wife of the Pharaoh Mentu'-hotep of the eleventh dynasty, about B.C. 2500, not many centuries before Abraham; it contains six vases, one of alabaster and five of serpentine, with dried remnants of drugs, two spoons, a piece of linen cloth, and some roots, enclosed in a basket of straw-work, the whole standing in a wooden chest found in the queen's tomb.[4] We may also mention here, as indicating the less formal character of the older medical practice, a curious letter from a husband to his dead wife, found attached to a small image of the latter. In it he upbraids the departed spirit for having produced disease in him, and while reproachfully calling to mind his kindnesses to her during life, thus describes her last illness: "When thou wast sick, with the sickness that thou hadst, did not I go to the physician and bid him make thy medicines for thee?—yea, he did all things whatsoever thou wouldst have him do".[5] This seems to imply that the lady to some extent directed her own treatment, and reminds us of the Homeric description of Egypt as the land where "each one is a physician, skilful beyond all men, for verily they are of the race of Paeon". But our chief source of information is

the "Ebers Papyrus," which, according to its discoverer, is not only the first known medical document, but the most ancient *complete* book in existence. It was written about 1550 B.C.—some time before the Exodus, though much of its contents is of far greater antiquity; and we have not only the entire work, but also the marginal notes of its owner, who has marked with a large "Good" those prescriptions of which he approves, while the original compiler has added notes of his own, such as, "This is a genuine remedy," or, "Excellent, I have often made it, and also proved it". But, though mainly a collection of receipts, the "Papyrus" also contains passages on anatomy and diagnosis, the chief of which is the chapter on the heart by a certain Nebsecht, whose grandson Prof. Ebers introduces into his interesting romance "Uarda". The vessels are said to run in pairs, in a manner very similar to that described by the early Greek physicians, though not much in accordance with nature, and to contain not only blood, but air, water, milk and other fluids. In the doctrine that the heart is the centre of the vascular system, and in the importance attributed to the pulse, the old Egyptian is in advance of Hippocrates himself: "If the physician places his finger on the head, neck, hands, arms, feet, or body, everywhere he will find the heart (*i.e.*, the pulse), for its vessels go to all parts". As examples of diagnosis, we may take the description of four forms of obstruction or constipation: "When thou findest a man with an obstruction—with pale face and beating heart—and findest on examination that his heart is hot and his belly swollen, that is an inflammation (?) that cometh from irritant food. Treat it with something that cools heat and opens the bowels, especially with a draught of sweet beer, poured upon dry neqaut fruit. Four times shall he eat or drink (it)." Other forms are that in which "the stomach moves to and fro under the fingers like oil in a bag," that where the patient "vomits and feels very ill," and that in which the belly is "hot and swollen," for each of which different treatment is required. Of prognosis, so pro-

minent in the Hippocratic writings, there is little mention, but here is an example: "If a new-born baby cries 'ny' he will live, if 'ba' he will die".

We cannot here discuss the multitude of prescriptions contained in this most ancient of medical books; a few examples may suffice: To soothe a crying baby a mixture of fly-dung with seeds of the plant schepen is recommended, which may have been only too effectual if, as is probable, schepen is the poppy. Nor is it impossible that this may be the composition of that soothing drug "nepenthe," which Polydamna, "wife of Thone, in Egypt gave to Jove-born Helena," and which has so much puzzled Homeric scholars.

The following receipt was probably used more frequently than any other: "Against all kinds of witchcraft—a large beetle; cut off his head and wings, boil him, put him in oil, and apply to the part. Then cook his head and wings, put them in serpent's fat, warm it, let the patient drink it."

Remedies for eye diseases (still one of the chief plagues of Egypt) are very numerous, and among them is one invented by "a certain Semite from Gebal," or Byblos, the sacred city of the Phœnicians. In another recipe "elder-berries from Phœnicia" are employed. Cosmetics, and prescriptions for household use are not neglected: "To make the skin of the face smooth, soak meal in spring water. Let her wash her face daily, and then apply the meal." "To keep away mice, smear everything possible with cat's fat." "To prevent the hefu-snake from coming out of his hole, put a dried ant-fish, or soda, or an onion upon it—he will not crawl out." Not only pills, potions, plasters, and inunctions, but even inhalations are used. Thus one medicine is to be sprinkled on a hot stone and covered with an earthen pot, "bore a hole in the pot, put a reed in the hole, put your mouth to the reed and inhale the steam that arises". The work concludes with a brief but most interesting chapter on tumours, which are to be tested with the fingers to see if they fluctuate. In that case they consist either of fat, and are usually to be treated by the knife,

being checked by cautery. But there is one tumour the most horrible of all, which becomes covered with pustules (? ulcers), discolours the skin, "makes figures," and causes sharp pains. "To such a tumour say, 'It is a tumour of the god Chensu'. Do nothing at all to it."[6]

According to Clement of Alexandria, the knowledge of the Egyptians was contained in forty-two sacred books attributed to the god Hermes (Thoth), of which the last six were medical, and treated of anatomy, diseases, instruments, drugs, and affections of the eye, and of women respectively. Manetho says that Athothis, second King of Egypt, wrote on anatomy, a story probably due to the resemblance of the names Athothis and Thoth, and Prof. Ebers considers that his papyrus is nothing less than the hermetic book on drugs. One hardly ventures to question so high an authority, but so far as can be judged from translations, the work seems to be rather a compilation than a sacred book. The chapters are of various age and authorship, and deal with other matters besides drugs, as, for instance, the doctrine of the heart and vessels, which is called the "secret of the physician," while the prescriptions given are by no means considered to be all of equal value. As to the origin of the work, it commences by saying, "I came forth from On" (Heliopolis), but in the next line we have, "I came forth from Sais," as if the compiler had made extracts from the medical libraries of several temples. All are agreed that charms and incantations are much less prominent in this than in later medical papyri. Galen, as we shall shortly see, was by no means above ordinary superstition, but the sacred books of the Egyptians went too far even for him, and he characterises them briefly as "all nonsense," a term which he would hardly have applied to the Ebers papyrus. Jamblichus tells us that the Egyptian philosophical books had become much altered in the hands of the Alexandrine Gnostics and Neo-Platonists, and one is tempted to think that the same was the case with the medical works, and that the books which Clement saw, and Galen read, bore more re-

semblance to those fragments of theosophy which have come down to us under the name of Hermes Trismegistus, than to the great Leipsic papyrus.

The other medical papyri are of little importance. One, at Berlin, somewhat resembles that of Ebers, but is smaller and of later date. It contains 170 prescriptions, no less than twenty-eight being enemata, a form of medication the origin of which was universally ascribed to the Egyptians. The continuance, or, perhaps, the revival of the demonic theory is indicated by the fact that the remedies are said to "attack," "repulse," or "destroy" the disease, the expressions "cure" or "alleviate" being rarely used.[7] About the time this papyrus was written occurred the famous trial of the conspirators against Rameses III. (B.C. 1200), one of whom, a high official, is charged with stealing a book on witchcraft from the royal library, and introducing waxen images, made according to its directions, into the palace, with intent to cause disease and death. The later writings are almost entirely given over to charms and love philtres.

One aspect of this demonic medicine is of some historical interest. To keep off spirits of disease or to hasten their departure the ancient Egyptian placed different parts of his body under the protection of special divinities. Thus, in head affections the supposed demon was told that he was attacking, not a mere mortal, but the great god Ra himself, and that he had therefore better escape speedily to avoid the wrath of the deity. Similarly Hathor protected the eyes, Osiris the muscles, etc. This doctrine, as we shall see, passed by way of the Gnostics and Neo-Platonists into mediæval medicine, the pagan gods being replaced partly by Christian saints, and partly by the heavenly bodies, especially the planets and signs of the zodiac.

Whatever we may think of Athothis, one Egyptian monarch certainly wrote on medicine—Nachepsus of Sais, (B.C. 700), grandfather of the Pharaoh Necho of the Bible, who is quoted both by Pliny and Galen. The latter tells us that this king was the first to observe the marvellous virtues

of green jasper, a stone which, when engraved with "a dragon with rays," and hung round the neck, is a sovereign cure for digestive disorders. Galen says he has made numerous experiments with these stones, and finds them no less effectual without the dragon. Some very beautiful examples of the engraved amulets may be seen among the Gnostic gems in the British Museum, where the Greek inscriptions call the dragon: "Chnoumis, the Destroyer of Demons".

The Egyptian physicians presided over the process of embalming (Genesis l. 2), but they seem to have entrusted the practical part to the temple servants, and as there is no evidence that the custom in any way furthered medical or anatomical knowledge, we need not here repeat the descriptions of Herodotus.

The surgical division of the healing art appears to have been much neglected, as has always been the case when medicine was in the hands of priests. The Bulak Museum contains a fractured thigh-bone, in which the fragments overlap more than two inches, and Mariette has met with many similar cases, which, he says, have given him a very poor idea of Egyptian surgery. The stories of pictorial representations of amputation, and of teeth stopped with gold found in mummies, have not been confirmed by later investigators.

Up to a recent period our knowledge of Egyptian medicine was gathered solely from scattered passages in Greek writers, some of which have already been noticed. The early Greeks looked with admiring wonder on the ancient civilisation of Egypt, and observing the strict dietetic rules of its inhabitants, who took medicines periodically even when in health, concluded that every Egyptian was a physician, and possessed of marvellous skill. In later times Herodotus and the prophet Jeremiah notice the numerous physicians, and the multitude of medicines, and the former writer tells us that each one devoted himself to some special disorder, a system only possible in very populous localities, or where the practitioner is not immediately dependent upon

his patients. Both these conditions were present in Egypt, where, in the reign of Amasis, 20,000 towns and villages filled the valley of the Nile, and where the physicians shared in the general income of the temples, to which the contributions of their patients were probably added.

Some of the stories told by the late writers, though of rather doubtful authenticity, are worth repeating. Thus, the people of the Delta are said to have found the squill (Scilla maritima) so useful in dropsy that they erected a temple in its honour; and we are told that Euripides, the poet, was recommended by the priests to take a course of sea bathing, and was much benefited thereby.

But the most remarkable thing about Egyptian medicine is its non-progressive character. More than a thousand years before Hippocrates we find a knowledge of anatomy and physiology quite equal to that of the Father of Medicine, together with a copious and varied materia medica, comprising mineral as well as vegetable remedies; yet when, in the sixth century B.C., Egyptian physicians come in contact with a Greek, they prove hopelessly his inferiors, and, as we shall see, owe their very lives to his skill. The Greek physicians of Alexandria seem to have learnt nothing from the Egyptians, and Galen mentions their medical writings with contempt. Let us try to find some causes for this remarkable failure.

It used to be thought that Egypt, for some mysterious reason, stood still for forty centuries, and that it made little difference to an ancient Egyptian whether he was born 4000 or 400 years B.C., but we now know that the nation underwent many changes, social and intellectual, no less than political, during this vast period. Had that ancient practitioner, Sekhet'enanch, returned to life in the days of Moses, he would have found his language scarcely understood, his dress worn only by statues of the gods and Pharaohs, and the state of society entirely altered. What changes he would have noticed in his own art, we unfortunately do not know; though, in all probability, medicine had already assumed a more formal and priestly character.

But, while this predominance of the priesthood was doubtless a chief cause of the failure of the early promise of Egyptian medicine, there were others almost as important. The Egyptians were essentially a matter-of-fact race; types of those practical people of whom it has been well said that they practise the errors of their fathers. Learning, indeed, is often praised by ancient writers, but only as a means to some material benefit; nor is there a trace of that love of knowledge for its own sake, without which no great progress in science has ever been made. "My son, apply thyself to learning, that thou mayest be a scribe," writes an old Egyptian. "The people are heavily laden asses, but the scribe is the driver. The scribe is never hungry; he sits at Pharaoh's table, and his belly is filled by reason of his wisdom." The Greek was the very reverse of this, and ever ready to speculate upon or investigate any subject for the mere pleasure of doing so. Science to him was a majestic goddess, a clear-eyed Pallas Athené: to the Egyptian she was a domestic cow, good only for what could be got out of her.

Again, the learned Egyptian was, before all things, a scribe or writer. He had invented no less than three forms of that art, an achievement of which he was justly proud, and one of the commonest figures in representations of Egyptian life is the scribe with his ink-pot taking notes. It is easy to see how this might lead to excessive reverence for what was written, insomuch that "book" and "science" came to be expressed in Egyptian by the same word. The Greek, on the contrary, was a man of speech and argument. Plato tells us that a physician did not prescribe for a free man till he had persuaded him, and though the custom of a patient arguing with his doctor has obvious disadvantages, it tends at least to keep the latter from sinking into a sleepy routine.

NOTES.

[1] Mariette (*Les Mastaba de l'ancien Empire*, D, 12) gives a facsimile of the tombstone, which he calls "an exquisite inscription

engraved in the best style of that epoch". A partial translation may be found in Meyer, *Geschichte des alten Egyptens*, ii. 95. Berlin, 1885. The frontispiece is a portrait of Sekhet'enanch and his wife copied from the tombstone. He carries two sceptres, emblems of power and rule confined to the highest dignitaries, and wears the panther skin which in the Old Empire formed part of the gala dress of the grandees, but was afterwards confined to a special class of priests. She wears the huge wig and single close-fitting garment which formed the universal and invariable dress of all Egyptian women from the fourth to the eighteenth dynasty (4000-1600). She is pictured three times on the tombstone, but in each case her name has been carefully erased.

[2] Compare the names of the two physicians here mentioned Sekhet'enanch (Sekhet, my Life); Nebsecht (Sekhet, my Mistress).

[3] At a still later period we find a special God of Medicine, Imhotep, son of Ptah and Sekhet, in whose temple at Memphis "incubation" (p. 40) was practised.

[4] In the Berlin Museum, see official catalogue.

[5] The exceptional interest of this letter may justify a complete translation. "To the wise soul (Ka) of the Lady Anchera. What evil have I done thee, that I find myself now in this miserable state in which I am? What have I done unto thee, that thou shouldst lay thy hand upon me, though no evil has been done unto thee? From the time I became thy husband until now, have I done anything against thee that I had to keep secret? Thou wast the wife of my youth, and I lived with thee. Then I filled all kinds of offices, and I lived with thee, and caused thy heart no sorrow. Behold, when I ruled over the captains of Pharaoh's footmen, and of his chariots, I caused them to come to thee, to throw themselves on their bellies before thee, and they brought many good things and laid them at thy feet. When thou wast sick, etc. Then when I had to go with Pharaoh and his company to the South land, my thoughts were with thee, and I passed the eight months without being able to eat or to drink. And when I returned to Memphis I besought Pharaoh, and came to thee, and made a great mourning for thee, I and my people before my house. I gave bandages and stuffs for thy burial, and had much linen woven, nor was I lacking in making good offerings for thee. Since then I have past three years mourning, without entering my house, or acting as I might have acted; and lo! I did all this because it was for thee!" A pathetic letter, though one suspects that the gallant officer got a scribe to compose it for him at so much a line. See Maspero, *Études Egyptiennes*, i. 145; *Erman* (*op. infra cit.*), i. 218. It is believed to date from the twentieth dynasty, *i.e.*, about B.C. 1200.

[6] Ebers, *Report of the Oriental Congress*, London, 1874; *Zeitschrift für Ægyptische Sprache*, 1873. The entire papyrus has recently been translated into German by Dr. Joachim, Berlin, 1890.

[7] Chabas, *Mélanges Egyptologiques*. Further information on the subject may be found in Erman, *Ægypten und Ægyptisches Leben im Alterthum*, to which I am much indebted; Maspero, *Life in Ancient Egypt and Assyria;* Mahaffy, *Prolegomena to Ancient History;* Sayce, *Herodotos*, i.-iii.; *Newbery House Magazine*, July, 1890; Rawlinson, *Herodotus*, and Wilkinson, *Manners and Customs of the Ancient Egyptians*, revised by Birch, 1878; Finlayson, *Medicine in Ancient Egypt, Brit. Med. Journ.*, 1893.

V.—HINDU MEDICINE.

THE earliest documents of that Indo-Germanic race to which we ourselves belong are the Vedas, or books of revealed "wisdom"—the two words having the same root. The oldest of these, the Rig-Veda (knowledge of praise), consisting of hymns composed B.C. 2000-1000, already mentions a special class of physicians; it also contains passages in praise of the healing power of herbs, and waters, and notices at least two diseases—phthisis and leprosy. But the fourth, or Atharva-Veda (knowledge of spells), compiled about 700 B.C., is, as might be expected, the most medical in character of the four great religious books. As we have already considered this aspect of the healing art, only one example need be given here; an invocation against Takman, the demon of fever, evidently adapted to high caste patients only: "May refusal meet Takman, who has glowing weapons. O Takman, go to the Mujavant or farther. Attack the Sudra (low caste) woman, the teeming one; shake her, O Takman." The most select remedies seem to have been preserved for princes; thus, when the son of Bimbisara—King of Magadha, about 600 B.C.—fainted, he was placed in six tubs full of fresh butter, and afterwards in a seventh filled with the most costly sandal-wood, after which it is interesting to know that the prince survived, and succeeded his father.[1]

Though the incantations of the Atharva-Veda were, doubtless, recited by Brahmans, it is important to notice that the physicians of the Vedic age did not belong to this priestly caste. They are classed in the ancient laws of Manu among those unclean persons who are excluded from the funeral feasts, and their origin is attributed in the Brahmanic writings to intermarriages between men and women of different caste. The majority, however, probably belonged to the great Hindu middle-class, the Vaisyas (agriculturists and traders), and in later times a physician might take as pupil a member of any caste except a Sudra.[2]

Besides the four great religious Vedas, the Hindus have certain supplementary "Upa"-Vedas later in date, and dealing with more worldly subjects—medicine, music, architecture, etc. The first of these is the Ayur-Veda (knowledge of life), a term not confined to any particular book, but including all works on medicine thought to have been in any way supernaturally "revealed".[3] It is especially applied to the works of Charaka, said to have been revealed by Indra himself through the medium of a Rishi, or sage, and to those of Susruta, dictated by the divine physician Dhanwantari, who became incarnate for that purpose.

The story of the birth of this Hindu Æsculapius is too curious to be omitted. A blight had fallen upon the universe, and the anxious gods came to their father, Vishnu, for advice. He declared that they must obtain the "Amrita," or drink of immortality, and that for this purpose the ocean of milk must be churned. Gods and demons, forgetting for a time their hostility, united in this stupendous work. The great serpent, Vasuki, twined himself round the mountain Mandara, and the gods and demons, grasping the monster by its head and tail, twirled the mountain round in the milk ocean upon the back of Vishnu himself, who lay in the shape of a huge tortoise at the bottom. Long they laboured, and the demons, who were nearest the serpent's head, became permanently blackened by the poisonous fumes from his hood; but at last the work was done, and there rose from

the churned ocean the moon, a marvellous tree, and sacred cow, the Goddesses of Love, Wine, and Beauty, and, finally, the white-robed physician, Dhanwantari, with the cup of the Amrita in his hand. In pity for the ills of mortals, he caused himself to be born on earth as a prince of Benares, and having retired to the woods as a hermit, after the manner of ancient Hindu princes, dictated to Susruta, a son of the famous warrior-sage Visvamitra, his Ayur-Veda.[4]

In the works of Charaka and Susruta we find a condition of medical and surgical knowledge not unworthy to be compared with that of the Hippocratic writers, of which, however, there is no indication in the earlier Vedic age, and which had left few traces of its existence in the sixteenth century of our era. Only a few particulars can here be given. The most striking feature is the high place assigned to surgery, a fact sufficient in itself to disprove the priestly origin of these works. "Surgery," says Susruta, "is the first and highest division of the healing art, least liable to fallacy, pure in itself, perpetual in its applicability, the worthy produce of heaven, the sure source of fame on earth." At the same time he emphasises the unity of medicine: "He who only knows one branch of his art is like a bird with one wing". Practical and theoretic knowledge must be combined: "He who is versed only in books will be alarmed and confused, like a coward on the battle-field, when in face of active disease; he who rashly engages in practice without previous study of written science is entitled to no respect from mankind, and merits punishment from the king; but he who combines reading with experience proceeds safely and surely like a chariot on two wheels". He similarly warns his pupils against unintelligent repetitions from books: the student who thus obtains his knowledge "is like an ass with a burden of sandal-wood, for he knoweth the weight but not the value thereof".

As a specimen of the general style of the work, and of Hindu military medicine, we may take chapter xxxiv. of the first book: "When the king goeth with his army against

rebels or enemies to punish their wickedness, he shall take with him a skilful physician, a pious penitent, whose prayers are heard (and an intelligent astrologer). The physician must see to the food, water, wood and places of encampment, and examine them carefully for they may be poisoned by the enemy. If he find poison he must remove it, and so save the army from death and destruction, and he may learn how to do this from the chapter on poisons. The pious penitent must keep off by his prayers evil influences arising from the breath (? incantations) of the powerful, the pains of the oppressed, and the shame of sin (and the astrologer must avert misfortunes indicated by the stars, directing them upon a specially appointed sacrifice). If disease arise in the army the physician must show the greatest diligence, and especially guard the king's person, for he involves the whole people, as saith the proverb: 'Were there no king the people would devour one another'. His tent shall be near the king's tent, and he shall have his books and drugs always at hand. There shall be a flag over his tent that the sick, poisoned, and wounded may find him quickly." Here the writer suddenly changes the subject: "The physician, the patient, the medicine, and the nurse are the four feet of medicine upon which the cure depends. When three of these are as they should be (gunavat), then by their aid the exertions of the fourth, the physician, are of effect, and he can cure a sore disease in a short time. But without the physician the other three are useless even when they are as they should be, just as the Brahmans who recite the Rig- and Sama-Vedas are useless at a sacrifice without the Brahman who recites the Yagur-Veda. But a good physician can cure a patient alone, just as a pilot can steer a boat to land without sailors. The physician who has pene-
ed into the hidden sense of the medical books, who has
taken part in operations, who has a ready hand,
l. and a bold heart, who has his instruments
by him, who possesses presence of mind,
and experience, and who sets the truth

above all things, such a physician may be called a true foot (pada) of medicine. The patient deserves this name when he has vital force, and nerve (to resist pain), no incurable disease, no great poverty, self-restraint (to avoid harmful pleasures), faith in the physician, and obedience to his directions. The drug to be called a 'pada' must grow on a good soil, and be gathered on a favourable day, be given in proper doses at a right time, and be fresh. Finally the nurse is a 'pada' when he is kind-hearted, without false shame, strong, trustworthy and mindful of the physician's orders."

The most famous achievement of Hindu surgery is the manufacture of new noses by flaps taken from the cheeks or forehead, an operation specially demanded in a land where despotic rulers and jealous husbands were singularly addicted to mutilating their victims. But Susruta also mentions the division of the supra-orbital nerve for neuralgia, and laparotomy and suture of the intestine for obstruction or injury—operations lately re-introduced into medicine. He describes more than one hundred instruments, the first and best of which is the hand, and carefully distinguishes twelve species of leeches, a section of his work afterwards highly valued by the Arabs, who in the eighth century A.D. translated portions of the works of both the great Hindu physicians.[5]

And this brings us to the important question: When did this remarkable development of Hindu medicine, which arose and vanished so mysteriously, actually take place? The lower limit is fixed by the above-mentioned translations at about 750 A.D., but it is very difficult to find a higher one. Older writers, relying on the fact that both Susruta and Charaka are mentioned in the great epic, Mahabharata, considered that the works attributed to them must be at least as old as the Homeric poems. But the Mahabharata underwent revisions and additions to a very late date, and recent Sanscrit scholars assert that the language of the medical books indicates an age certainly not long anterior to Alexander's invasion, B.C. 327, and

possibly even later than this. Now these dates, B.C. 327-A.D. 750, nearly correspond to the period of the predominance of Buddhism in India, and it seems highly probable that this Buddhist millennium was also the golden age of Hindu medicine. The brotherly love and sympathetic pity inculcated by the "enlightened" was more likely to favour the progress of the holiest of arts than the caste prejudices and endless formalities of Brahmanism; nor are we without definite indication of the high honour in which Buddhists held the physician. Thus one of the chief evils of poverty is that the poor man cannot get a physician or medicine, and travellers are warned against settling in a land where there are not five things—a king, a river, rich men, teachers and—physicians.[6] When King Asoka, the Constantine of Buddhism, made that faith the religion of his empire, B.C. 250, he issued a series of edicts, two of which have reference to our present subject. In the first, "the man of loving spirit, beloved of the gods," declares that no animal is to be put to death, and we may, perhaps, connect this with the extraordinary passage in Susruta which forbids medical aid to hunters and to all who kill or trap animals. In the second, Asoka says that he has established two "cures," one for men and another for animals, not only throughout his own dominions, but in those of neighbouring monarchs, and has arranged for the collection and planting of medicinal herbs in those places where they do not exist.

There can be little doubt that these "cures" included hospitals, and possibly even medical schools. Buddhist pilgrims from China in the fifth and seventh centuries tell us of houses of mercy for the sick which they found in various parts of India, and the famous hospital for animals at Surat may conceivably have owed its origin to Asoka.

The Mahavansa, or Cingalese chronicle, gives us still clearer evidence on the subject. When King Duttha Gamani was on his death-bed, B.C. 161, he ordered the record of his deeds to be read to him, in which it was said: "I have daily main-

tained at eighteen different places, hospitals provided with suitable diet, and medicines prepared by medical practitioners for the infirm ". King Buddhadasa (A.D. 341) was a mine of virtue and an ocean of riches, who patronised the righteous, discountenanced the wicked, and comforted the sick by providing medical relief. The stories of his own cures are mostly mythical. "A priest hurriedly drank some water which had frog's spawn in it, and an egg entering the nostril ascended into the head, and being hatched became a frog. In rainy weather it croaked and gnawed the head of the priest. The Rajah, splitting open the head and extracting the frog, and re-uniting the severed parts, quickly cured the wound." There seems no reason, however, to doubt the essential truth of the following: "Out of benevolence entertained towards the inhabitants of the island, the sovereign provided hospitals, and appointed medical practitioners thereto for all villages. Having composed a work containing the substance of all medical science, he circulated it among the physicians of the island for their future guidance. He ordained that there should be a physician for every ten villages. He set aside twenty royal villages for the maintenance of these physicians, and appointed medical practitioners to attend on elephants, on horses, and on the army. On the main roads he built asylums in various parts for the reception of the lame and blind. This man of great compassion was wont to carry his case of surgical instruments in the folds of his loin cloth, and to afford relief to every afflicted person he met."

But the most important of the Cingalese hospitals was that founded by Parakkama the Great (1164-1189). "And this ruler of men built further a large hall that could contain many hundreds of sick persons, and provided it with all things needful as stated underneath. To every sick person he allowed a male and female servant, that they might minister to him by day and night and furnish him with the physic that was necessary and with divers kinds of food. And many storehouses also did he build therein filled with grain, and with all things useful for medicine. And he also made provision for the maintenance of wise and learned

physicians, who were versed in all knowledge and skilled in searching out the hidden nature of diseases. And it was his custom, on the four Uposatha days of every month, to visit that hall together with his ministers. And being endued with a heart full of kindness, he would look at the sick with an eye of pity, and being eminent in wisdom and skilled in the art of healing, he would call before him the physicians that were employed there, and inquire fully of the manner of their treatment. And if so be that the treatment they pursued was wrong, the king, who was the best of teachers, would point out wherein they had erred, and would make clear to them the course they should have pursued according to science, and to some sick persons he would give physic with his own hands. Likewise also he would inquire of the health of those that were sick, and to such as were cured he would order raiment to be given. Thus did this merciful king, free from disease himself, cure the sick of their divers disorders from year to year. But there yet remains another marvel to relate, the like of which had neither been seen or heard of before. A certain raven that was afflicted with a canker on his face, and was in great pain, entered the king's hospital, and, as if bound by the spell of the king's great love for suffering creatures, quitted it not, but remained there as if its wings were broken, cawing very piteously. Thereupon the physicians, when they had found out what his disease was, took him in by the king's command and treated him; and after he was healed, the king caused him to be carried round the city on the back of an elephant, and then set him free. Verily kindness such as this, even when shown unto beasts, is exceeding great. Who hath seen such a thing, and where or when hath it been heard of before?"[7]

NOTES.

[1] Duncker, *History of Antiquity*, vol. iv., pp. 281, 323.

[2] According to Susruta, "Even a Sudra, if of legitimate birth and otherwise qualified, may be taught the art (of medicine) except the Mantras, *i.e.*, Vedic incantations".

[3] The later legend of the Hindus speaks of an original Ayur-Veda composed by Brahma himself in 100 sections and 100,000 stanzas (slokas),

but afterwards shortened to adapt it to the limited life and capacities of man, and some see the remains of such a work in the poetical parts of Susruta. But we find exactly the same story applied to the so-called "Laws of Manu," and it seems to be merely an Oriental way of saying that Law and Medicine are sciences of great antiquity, extent, and importance.

[4] Vishnu-Purana, translated by Wilson, 1840.

[5] This, which seemed the one recognised fact in the chronology of the subject, has recently been questioned by Dr. Haas in two interesting papers: "On the Origin of Hindu Medicine" and "Hippocrates and the Hindu Medicine of the Middle Ages" (*Zeitschrift der Deutschen Morgenländische Gesellschaft*, vols. xxx. and xxxi.). His conclusions are (1) that the work of Susruta was unknown outside India before A.D. 1500, when it was translated into Persian; (2) that the original is probably not very much older than this; (3) that all Hindu medical science worthy of the name is merely a faint reflection of that of the Greeks, seen through an Arabic medium. Nay, Susruta is himself none other than Hippocrates, whose name has been confounded with that of Socrates and corrupted thus, Bucrata—Sucrata—Susruta. He is said to have been born at Benares (*Kasi*) because Hippocrates was a native of Cos, and to have been ruled by his wife, because Socrates was hen-pecked by Xanthippe. Some other learned German will probably shortly tell us that Charaka is merely a corruption of Pythagoras, but meanwhile the reader may take the view given in the text as the one still generally accepted. The chapter above translated is from the German of Dr. Haas. He translates the first half from the Persian only; but, with the doubtful exception of the astrologer, the version is very exact, as may be seen by comparing it with the Latin rendering of Hessler (2 vols., 1844-7). According to Haas, the second half is merely an Oriental expansion of the famous passage in Hippocrates. "The art (of medicine) depends on three things, the disease, the patient, and the physician. The physician is the servant of the art (or of nature). The patient must overcome the disease by the aid of the physician."

[6] Burnouf, *Introduction a l'histoire du Buddhisme*, 1844, and *Le Lotus de la Bonne Loi*, 1852.

[7] Mahavansa, Tournour's translation, revised and completed for the Ceylon Government by C. J. Wigesintha (Colombo, 1889), caps. 32, 37, 73. Other authorities are Royle, *Antiquity of Hindu Medicine*, 1837; Wise, *Commentary of the Hindu System of Medicine*, 1860, and *Review of the History of Medicine* (2 vols., 1867); Webb, *Historical Relations of Ancient Hindu with Greek Medicine*, 1850; Weber, *History of Indian Literature* (translation), 1878; Wilson's *Essays on Sanskrit Literature*, 1864; Manning, *Ancient and Mediæval India*, 1869. The first eight chapters of *Susruta* have been translated into English by Anna Moreswara Kunte, Calcutta, 1877.

VI.—CHALDEAN AND PERSIAN MEDICINE.

IN the opinion of Herodotus,[1] the ancient Babylonians showed great wisdom in their treatment of the sick, for they had no physicians, but if any one was ill he was put out in the public square, and etiquette demanded that every passer-by should ask him to describe his symptoms. If the stranger had heard of a similar case, or had himself had the disease, he was expected to give advice as to treatment.

Modern discoveries confirm these statements in so far that it is very difficult to find a class of Chaldean physicians distinct from astrologers and soothsayers, and Prof. Sayce tells that the same word was used to express "physician," "scribe," and "seer". But the state of medicine revealed by the cuneiform texts by no means justifies the good opinion of the historian, for it is probably the lowest form that ever existed in a civilised community. The Chaldeans appear to have contributed absolutely nothing to the general stock of medical knowledge, and we shall, therefore, notice them very briefly. Primitive theories predominate throughout: there are the usual demons causing disease, and the usual invocations against them, both of which the reader will find fully discussed in Lenormant's *Chaldean Magic;* but Prof. Sayce has recently translated fragments of a Babylonian work on medicine, which formed part of the library of Assurbanipal (Sardanapalus), 669-626 B.C., and which appears to indicate some progress towards a more rational practice. In it the patient sometimes has his choice whether he will use charms or medicines, and the prescriptions given comprise a considerable variety of drugs, though their precise nature cannot often be determined.

The following are examples: "For a diseased gall bladder, mix water and strong wine; drink quantities of calves' milk; calves' milk and bitters drink in palm wine; garlic and bitters drink in palm wine". As the translator observes, these prescriptions are in a sense homœopathic, the "bitter"

or gall bladder being cured by bitters. "For the attack of a demon, which after seizing a man cuts the top of his heart, for his preservation, the slice of a bird, sisi, siman, kharkar, bîmu, the very great snake, the seed of the bîmu, and the seed of the cedar must be drunk in palm wine."

It is also interesting to learn that the Babylonians were forbidden to use medicines on the sacred seventh day.[2]

While, however, taking this unfavourable view of Chaldean medicine, it is well to remember that much yet remains to be discovered, and that the mounds of Mesopotamia may possibly still contain medical writings worthy to be compared with those of ancient Egypt.

The medicine of the Medes and Persians somewhat resembled the Chaldean, but had a still closer analogy to that of their near relatives, the Hindus, with the important difference that it produced no Susruta or Charaka. In place of the Vedas we have the Zend-Avesta, a work ascribed to Zoroaster, but of very doubtful date and authorship. It is said to have consisted of twenty-one books, containing no less than 2,000,000 verses, and to have been written upon 1200 cowhides. The healing art seems to have been very frequently mentioned; for Pliny, who had seen a Greek abstract of the entire work, declares that the religion of the Persians was evidently founded on medicine. Little of the Avesta has survived except the nineteenth book, the Vendidâd, or code of purifications—literally, "The law against demons". Here we find the famous dualistic doctrine of the government of the world by a good and an evil deity, whom, until Orientalists are more agreed in their orthography, we may still venture to call Ormuzd and Ahriman.

Ahriman, according to the Vendidâd, created by his evil eye 99,999 diseases, apparently in the form of demons, whereupon Ormuzd appealed for aid to Aryaman, "the friend," a god of heavenly light, who is mentioned in the Vedas. Aryaman destroys diseases by reciting the Holy Word; but Ormuzd also took the 10,000 healing herbs which grew around the tree of everlasting life, and brought

them to Thrita, an ancient sage and sacrificer (another Vedic personage), to whom also Kshathra-Vairya, Lord of Metals, gave a knife, of which the point and base were set in gold. Thrita thus became the Persian Æsculapius, and physicians are urged to follow in his footsteps, and, like him, fight valiantly against the demons of impurity and disease. This story indicates the triple division of Persian medicine. "When physicians compete, O pure Zoroaster," says Ormuzd, in another passage, "knife-doctors, herb-doctors, and word-doctors, then shall the believer go to him who heals by the Holy Word, for he is a healer of healers, and benefits the soul also."

If a Persian wished to practise medicine, he must first experiment upon unbelievers; should three of these die under his hands he is for ever incapable; should he cure three, he is qualified to act as physician to the worshippers of Ormuzd "for ever and ever," says the Vendidâd, though some learned commentators held that the qualification might be lost.

The Vendidâd also fixes the amount of medical fees. A priest must be healed for his blessing; the head of a house, a village, or a town for the price of an ox, of low, average, or high value respectively, while the lord of a province must pay the price of a chariot and four. The physician is also to treat animals, especially the dog, for which he must receive the value of the animal next in rank, and in the case of a sheep, the lowest on the list, his payment is the price of a "good meal". Dogs must receive the same drugs which are given to rich men; and to Zoroaster's inquiry, what is to be done if the dog refuses to take medicine, Ormuzd replies that in such a case it shall be lawful to bind him, and force open his mouth with a stick.

One would have thought that a land where fees were fixed on so liberal a scale, and secured by the sanctions of religion, would have been a very paradise of physicians. But this was far from being the case. The medicine of the Medes and Persians seems to have been as conservative as

their laws. The "word-doctor" long maintained his baleful pre-eminence, and the art of healing is probably as little indebted to the land of Iran as it is to the valleys of the Euphrates and the Tigris. The Persian kings, wisely enough, entrusted themselves neither to the Chaldeans nor to their own countrymen, but got their physicians first from Egypt and afterwards from Greece; and so valued were the latter that if a practitioner in the Asiatic colonies became at all distinguished for his skill he was liable to be kidnapped and carried off to the Persian Court.

In a later age, shortly before the faith of Zoroaster was driven from its ancient home by the sword of Islam, we shall find Persia the seat of an important development of medical science, but this also was mainly due to the labours, not of native, but of foreign physicians.

NOTES.

[1] i. 197. It has been suggested that Lamentations i. 12 is a reference to this practice.

[2] *Zeitschrift für Keilschriftforschung*, vol. i.; *Newbery House Magazine*, July, 1890 ("The Practice of Medicine in the Ancient East"), and *Hibbert Lectures*, 1887.

For the Vendidâd and Persian medicine generally see Darmesteter's translation of the Zend-Avesta, part i., in *Sacred Books of the East*, vol. iv.; Justi, *Geschichte des alten Persiens*, 1879; Duncker, *History of Antiquity*, vol. v.

VII.—THE EARLIEST GREEK MEDICINE—HOMER—ÆSCULAPIUS.

AMONG the lost treatises of Galen is one "On the Practice of Medicine in Homer," [1] a subject which has since been very frequently discussed in works ranging from Daremberg's *La Médecine dans Homère*, where every word in the poems of possible medical significance is considered, down to monographs, such as Fröhlich's *Hygienic Thoughts on the*

Chiton of the Homeric Heroes, which appeared in that serious work, Virchow's *Archiv*, and was preceded by papers on the medical aspects of *Barracks during the Trojan War*, and *The Head-dress of the Homeric Heroes*, titles reminding us of the famous German feat of evolving a camel from the inner consciousness. For Homer, though he does not, like a great mediæval poet,[2] professedly omit all medical details as unsuited to polite ears, treats the subject to some extent from a poetic standpoint. His wounded heroes either die at once, or, after very simple treatment, return to the fight as vigorous as before. There are no cases of traumatic or inflammatory fever, and no one dies from secondary hæmorrhage; while, except the plague, which forms an essential part of the story, there is no mention of those epidemics which have always formed the scourge of camps. But all this is surely to be attributed, not to the hygienic advantages of scanty dress and well-ventilated huts, but to the fact that descriptions of disease are not suited to epic poetry. Ordinary disease is seldom noticed, the chief passages being *Od.*, v. 395, where the joy of Ulysses at the sight of land is compared to that of sons who see their father recovering from a long illness, in which an angry god assailed him; and ix. 411, where the blinded and howling Cyclops is told by his friends that, if he is ill, he should remember that sickness comes from Zeus, and is unavoidable. It is interesting to note that in both cases we find a supernatural theory of disease.[3] Though a knowledge of drugs is the chief mark of a physician internal medicines are rarely mentioned, the word "pharmakon" denoting in the *Iliad* outward applications only, while in the *Odyssey* it means either a poison or a charm, such as those of Circe. Indeed, Helen's nepenthe seems to be the nearest approach to what we should call a medicine, for the mixture of Pramnian wine with cheese and barley-meal, which Nestor gave the wounded Machaon, appears to have been an ordinary form of food, since Nestor takes it himself, and, with the addition of honey, it forms the "mess" which

Circe set before the sailors of Ulysses, and in which she placed her baleful pharmaka.

The most prominent part of Homeric medicine is naturally the treatment of wounds. Every one seems able to render aid in emergencies; thus, when Ulysses is wounded by a boar, his comrades skilfully bind the wound and recite the appropriate incantations; but there is already a special class of men, skilled in removing embedded weapons, who know the drugs which stop bleeding and lessen pain. These are "the physicians skilled in medicines" who look after the wounded, and an equal or still higher knowledge is possessed by certain chiefs, Achilles, Patroclus, and, above all, the two sons of Æsculapius, "the cunning leeches" Podalirius and Machaon. The social position of these "Iatroi" is a very respectable one; in war they are "worth many other men," in peace they are, like the seer and the minstrel, welcome guests in the halls of the heroes (*Od.*, xvii. 384). It is important to notice that there is no trace of any connection between this medical class and priests; if Calchas is called upon in the plague, it is purely in his capacity of seer; some god is angry; who he is, and how to appease him, are clearly theological not medical questions. Besides physicians, women have a knowledge of drugs: thus Nestor distinguishes a hero whom he slew in his youth, by saying: "He had to wife the fair-haired Agamedé (the very wise) who knew all drugs, so many as the wide earth nourisheth" (*Il.*, xi. 740). Circe and Helen have already been mentioned. As final examples of Homeric medicine we may mention the revival of Hector when struck down by Ajax by means of copious douching with cold water; a truly heroic method of treating collapse (*Il.*, xiv. 435): while Ulysses, after the slaughter of the Suitors, purifies his house by burning sulphur in the most approved modern fashion[4] (*Od.*, xxii. 481).

Æsculapius (Asklepios), as every one knows, is the God of Medicine, but in Homer he is merely a Thessalian chieftain, who, like Achilles, has learnt from Chiron the knowledge of

drugs, and has taught it to his sons, just as Achilles taught Patroclus. But Arctinus of Lesbos (B.C. 770), the first Greek poet of whose personality we are certain, already invests him with supernatural attributes, and tells us that "he endowed one of his sons with nobler gifts than the other; for while to the one (Machaon) he gave skilful hands to draw out darts, make incisions, and heal sores and wounds, he placed in the heart of the other (Podalirius) all cunning to find out things invisible, and cure that which healed not," a passage in which medicine and surgery are clearly distinguished, and precedence given to the former.

It was probably about this time that temples began to be erected to the God of Medicine; and in these "Asclepieia," which became very numerous (over 300 being mentioned by classic writers), there developed a peculiar form of medical treatment known as "incubation". Traces of this practice are to be found in ancient Egypt, but our earliest and most important notice of it in Greece is in the Plutus of Aristophanes (B.C. 388). The sick person after sacrifice and purification lay down to sleep near the altar of the god, and the mode of treatment was revealed to him either in a dream, or more directly by the priest himself, dressed so as to represent the deity. On recovery, he presented thank-offerings, sometimes including models of the affected part in wax, silver, or even gold (thus the temple at Athens possessed, among other treasures, a silver heart, gilded legs, gold and gilded eyes, etc.), and a tablet was put up describing his illness and its treatment. According to Pliny and Strabo, Hippocrates was much indebted to the tablets thus accumulated in the Asclepieion at Cos, and modern writers have even made the "Father of Medicine" himself a priest of Æsculapius. This latter point will be discussed when we come to speak of the Asclepiadæ; but the medical importance of the temple records has probably been much exaggerated. Unfortunately no ancient writer has thought it worth while to copy any of

them, and—excepting the curious inscriptions recently discovered at Epidaurus—we are limited to three or four examples, of late date and doubtful authenticity, found at Rome.[5] The cures there described are of a semi-miraculous nature, and the treatment, naturally, such as would connect them with the divine influence of the god. They differ from the histories of cases given by Hippocrates in every possible way, and if the inscriptions at Cos at all resembled them they can only have been useful to him as warning examples of what a clinical history should not be. The following may serve as an specimen: "Julian, being in a hopeless state on account of a spitting of blood, was directed by the god to take pine-seeds from the altar, mix them with honey, and eat them during three days. He recovered, and returned thanks openly before the people."

But incubation was practised at other shrines than those of Æsculapius, and especially in the temples of the Græco-Egyptian god Serapis. Before his altar at Babylon Alexander's generals slept for many nights during their master's last illness, vainly hoping that the god would reveal a remedy, for it was not always requisite that the patient himself should incubate, and at some places there were even professional dreamers who might be hired for the occasion. Other healing divinities were Apollo, Athene, and Hercules, to all of whom altars were erected in the great temple of Amphiaraus at Oropus. Here, where the prophet prince of Argos had been mysteriously swallowed by the earth, as he warred against Thebes, arose a sacred spring, and near it a shrine and oracle where the patient might enjoy the advantage of a consultation of medical divinities. Having fasted three days from wine and one day from all food, he lay down to sleep on the fleece of a ram sacrificed to the deities. If the treatment indicated was successful, he gave thank-offerings and threw coins into the sacred well, and so famous for its cures did this temple at one time become that it is said to have ruined all the Asclepieia in Bœotia.

LANE MEDICAL LIBRARY
STANFORD UNIVERSITY
MEDICAL CENTER
STANFORD, CALIF. 94305

NOTES.

[1] Quoted by Alexander of Tralles, ix. 4.

[2] Gottfried of Strasburg, *Tristan und Isolt.*

[3] The other notices are mainly negative, thus no "hateful malady" invades the happy island of Syria (*Od.*, xv. 403), the mother of Ulysses died not from "lingering illness" but through longing for her son (xi. 200), and the rich Corinthian Euchenor came to Ilium, because it was foretold that he should either die of a painful disease or be slain by the Trojans, and he preferred the latter (*Il.*, xiii. 670).

[4] The title "cure of ills," here applied to sulphur, seems to show that the substance was in common use as a medicine.

[5] First published by Mercurialis, *De arte Gymnastica*, 1557, copied by most medical historians, and in *Brit. Med. Journ.*, 1887, ii. 904.

Dr. Fröhlich has collected his papers on the subject in *Die Militärmedicin Homer's* (Stuttgart, 1876), which includes a copious bibliography. See also an article by the late Dr. Dunbar, *Brit. Med. Journ.*, 1880, vol. i.

For incubation see Rittershain, *Der Medicinische Wunderglaube und die Incubation im Alterthume* (Berlin, 1878); Plautus, *Curculio;* Aristides, *Sacred Orations* (Dindorf, 1827); and the chapters on Asclepios in Harrison and Verral, *Mythology and Monuments of Ancient Athens* (1890); Diehl, *Excursions in Greece* (trans. 1893); Gardner, *New Chapters in Greek History* (1892).

VIII.—THE PHILOSOPHERS—DEMOCEDES—THE ASCLEPIADÆ.

CELSUS tells us in a well-known passage that Hippocrates first separated medicine, not from priestcraft, but from philosophy.[1] Several of the older philosophers are said to have rendered aid in epidemics, and to have treated their friends and pupils medically, but of more importance are the influences which their views of nature had upon medical theories, and their early attempts at anatomy. These were chiefly concerned, as might be expected, with departments in which mind and body seem to be in closest contact, the organs of special sense, and the processes of generation, sleep and death. Pythagoras (B.C. 580-510) tended his followers when sick, and went to Delos to cure his master, Pherecydes, of phthiriasis. He also established a strict

system of dietetics, and thought highly of the curative powers of music, especially in diseases of spring-time, and when the mind was affected. His ideas of the mystical value of numbers may have had something to do with the Hippocratic doctrine of critical days, and his followers, we are told, paid much attention to medicine, preferring always the most soothing forms of treatment, and avoiding, as far as possible, the knife and cautery.[2]

Pythagoras spent the latter part of his life at Croton, a great Achæan colony in South Italy, famous in antiquity for healthy situation, fair women, and strong men. According to Herodotus, the most famous physicians of his day came from this city, and it has been suggested, though without much evidence, that they were Pythagoreans. Of the two whose names have come down to us, Alcmæon and Democedes, the former was rather a philosopher than a physician, though his doctrines differ widely from those of Pythagoras. Alcmæon is said to have been the first Greek anatomist, and to have dissected the eyes and ears of animals, discovering the optic nerve and the Eustachian canal. He explained hearing by the hollow bone behind the ear—"for all hollow things are sonorous," taste by the warmth, moisture, and softness of the tongue, while odours are perceived directly by the soul, which resides in the brain. Sleep and waking he held to be due to the ebb and flow of the blood in the great vessels, the cessation of which causes death. Specially interesting is his description of disease as a disturbance of the equilibrium of the vital activities by the predominance of some one of them, a definition peculiarly consonant with the views of the Greeks, who loved to see harmony and proportion in all things, and to whom a "monarchia," or dominance of one, was the root of all evil both to the State and the individual.[3]

Democedes (about B.C. 520) is the first physician of whom we have a trustworthy history. Herodotus relates that, having migrated from Croton to Ægina, Democedes so excelled his colleagues that he was chosen public medical

officer at a salary of one talent (£240) per annum. In the following year he went in the same capacity to Athens, where he received £406, and finally was invited to Samos by Polycrates, who paid him £480 a year. In estimating these sums we must remember that money had then many times its present purchasing power, and that the salary of an Athenian ambassador, in the days of Aristophanes, was two drachmæ (eighteen pence) a day, less than one-twelfth the amount given to Democedes. On the treacherous murder of Polycrates by the Persians, Democedes became a slave, and was finally brought to the Court of Darius, where he cured the king of a sprained ankle, and rescued the Egyptian surgeons, who had failed to do so, from impalement. Soon afterwards he successfully treated the queen for a mammary abscess, and received from the grateful monarch all he could ask for except liberty. But to an ancient Greek liberty was the half of existence, and to obtain it Democedes offered to act as a guide to Persian spies, and, perhaps, to win over the leading men of his country to the Persian cause. On reaching Croton he, of course, refused to accompany his escort any farther, and with the wealth given him by Darius, he obtained a beautiful wife, the daughter of Milo the athlete. Later writers tell us that his fellow-townsmen, so far from being indignant at conduct calculated to bring upon them the wrath of the great king, elected Democedes their chief magistrate, and it may have been at his instigation that Phäyllus of Croton fitted out the trireme which singly and honourably represented the colonies of Magna Græcia on the great day of Salamis.

The story of Democedes is important as showing that there was a well-established and extremely well-paid public medical service in Greek cities in the sixth century (B.C.), and there are indications of this at least a century earlier. Thus Diodorus[4] tells us that Charondas, the lawgiver (B.C. 620), was greater than those who came before him, inasmuch as the mind exceeds the body, for he ordained free education in the cities for which he legislated, while they

only provided a free medical service. The still earlier laws of Zaleucus forbade any one to drink undiluted wine, except by order of a physician.[5]

Democedes may have gained some of his skill in the gymnasia of Croton, and it is certain that the gymnasiarchs or trainers often invaded the domain of medicine, especially in the departments of dietetics, the use of ointments, and the treatment of sprains and dislocations. Some, like Herodicus of Selymbria, went still further, and declared that all diseases, even acute fevers, might be treated by appropriate exercises.[6]

But we must pass to another medical philosopher, hardly less famous than Pythagoras, Empedocles of Agrigentum (B.C. 490-430). The following is from a fragment of his poem, "On Nature":—

> Listen, first, while I sing the four-fold root of creation,
> Fire, and water, and earth, and the boundless height of the æther,
> For therefrom is begotten what is, what was, and what shall be.

Substituting air for æther, this is the doctrine of the four elements, which Empedocles introduced into philosophy, and which, with the corresponding four qualities, heat cold, moisture, and dryness, and the four humours, blood, phlegm, black and yellow bile, lies at the base of Greek medical theories. Empedocles discovered the labyrinth of the ear, and explained sound by the impact of the air upon it, as upon a drum. He is also said to have cured a woman who lay in a trance thirty days, and to have removed the unhealthiness of certain localities by blocking up a mountain cleft and diverting the course of a river.

Empedocles dedicates his poem, "On Nature," to Pausanias of Gela, the "Asclepiad," which, if not a mere poetical expression, is the first mention of a most important class of physicians, to which Hippocrates himself belonged—the Asclepiadæ. Theopompus, the annalist (B.C. 350), tells us that the physicians of Cos and Cnidus were descended from Æsculapius through Podalirius,[7] that they came from

Syrnum in Caria, and that they were called Asclepiadæ. The idea that these Asclepiadæ were priests, supported by no ancient authority, is now generally abandoned, and with it the theory that Greek medicine originated in the temples of Æsculapius.

The Greeks, in fact, had no sacerdotal class, the depository of divine mysteries, as in Egypt and India; their priests were merely guardians of shrines who were usually appointed by the State. Physicians, as we have seen, were quite distinct from priests in the days of Homer, and we have been able to trace the existence of lay practitioners in Greek cities to a period probably nearly as ancient as the deification of Æsculapius.

But if the Asclepiadæ were not priests what were they? We know little more than what is mentioned above; but in all probability they formed a guild or corporation, the leaders of which traced their descent to Æsculapius, but which admitted others to its ranks upon their taking an oath of membership. The text of this oath has come down to us among the writings attributed to Hippocrates, and in dignity of tone and high morality it is well worthy of its supposed author.

To conclude. We find in ancient Greece, besides physicians proper, three classes of men connected with the healing art, priests, philosophers, and gymnastic trainers, corresponding roughly to our faith-healers, pure physiologists, and bone-setters respectively. The profession of medicine was separate from, though to some extent indebted to, all three, but it was most separate from, and least indebted to, the priests.

NOTES.

[1] "Primus quidem ex omnibus memoria dignus, ab studio sapientiæ disciplinam hanc separavit" (*De Medicina*, in præf.).

[2] Iamblichus, *Vita Pythagoræ*.

[3] For Alcmæon see Plutarch, *De placitis philos.*, iv. 179. For Democedes, Herod., iii. 125-157; Athenæus, xii. 22; Ælian, *Var. Hist.*, viii. 17; Suidas (*sub voce*); Dion Cassius, xxxviii. 18; Dion Chrysos-

tom, *Orat.* 77; Tzetzes, *Hist.*, ix. 3. An interesting account of Croton and its great men is given by Lenormant, *La Grande Grèce* (1881-84, 3 vols.).

[4] xii. 15.

[5] Athenæus, x. 33; Ælian, *Var. Hist.*, ii. 37.

[6] Soranus mentions a Herodicus among the teachers of Hippocrates, but this was probably Herodicus of Leontini, brother of Gorgias the rhetorician, not the gymnasiarch, whose mode of treating fevers by exercise is severely censured in the Hippocratic writings (*Epidemics*, bk. vi.).

[7] The legend relates that Podalirius, returning from Troy, was wrecked on the coast of Caria and rescued by a goat-herd, who took him to the palace. He found every one in great concern about the king's daughter, Syrna, who had fallen from the roof in a fit, and was still insensible. Podalirius restored her by bleeding from both arms, and received her hand and the Carian chersonese as his fee. There he built two cities, calling one after his wife and the other after the goat-herd (Stephanus Byzant, *Ethnica*).

On the general subject consult Daremberg, *État de la Médecine entre Homère et Hippocrate* (1869), and for a further discussion of the relation between the Asclepiadæ and the priests of Æsculapius see appendix ii.

IX.—HIPPOCRATES.

THE remark wittily made on the Homeric question, that the poems were not written by Homer, but by another man of the same name, might probably be applied with literal truth to some of the Hippocratic writings, for we know no less than seven physicians named Hippocrates, who lived during the period when this collection was being formed. It is the second of these, the probable author of about one-fourth of the treatises, who is the most famous of all physicians, and of whom some account must now be attempted. Born B.C. 460, the supposed descendant of Æsculapius and Hercules, Hippocrates lived during that wonderful epoch called the age of Pericles, when there appeared, within the narrow limits of the Greek world, more men of genius than

have, perhaps, existed together in Europe since. Biographical details do not come within our present scope, and the biography of Hippocrates is almost entirely apocryphal. He is universally known as the Father of Medicine. He was called "The Great" even by his own contemporaries.[1] In the darkest ages of medical ignorance the term "Hippocratic" still denoted all that was considered best and highest in the art. At the Renaissance, the wildest revolutionists, who despised Galen and Avicenna, still reverenced Hippocrates, and his name has been inscribed upon the banners of all the reformers of medicine from the sixteenth century downwards. It will be well, therefore, before attempting an account of the Hippocratic medicine, to discuss a few of those services which justify the pre-eminence thus given to the great Asclepiad.

Though there were physicians before Hippocrates, to whose discoveries he himself always renders due honour, the reforms he introduced were so important, and the impress which his genius left upon the whole art was so great, that the title, Father of Medicine, is well deserved. Three only of the principal aspects of his work can be here discussed: his introduction of more detailed observations of disease, the high importance which he attributed to prognosis, and his rejection of the supernatural in medicine.

Hippocrates has left us forty-two clinical histories, almost the only ones which have come down from antiquity, and of these the shortest may be taken as an example, which should be compared, or, rather, contrasted with the temple inscription given above.

"Seventh case (of the second series).—A woman at the house of Aristion with sore throat, which began from the tongue; speech indistinct, tongue red, and became parched. First day, she felt chilly, and was then feverish. Third day, a rigor and acute fever; a reddish, hard œdema on both sides of the neck and chest; extremities cold and livid; respiration laboured; fluids returned through the nose; could not drink; constipation and suppression of urine.

Fourth day, all the symptoms grew worse. Fifth day, the patient died." Neither here nor in any other case does Hippocrates name the disease, giving opportunity for many diagnostic attempts by the commentators. Thus Wunderlich suggests that the above was a case of scarlatina, with acute nephritis, while others have called it erysipelas. With the exception of a few cases in which bleeding or enemata are mentioned, there is no notice of the remedies employed, perhaps because the ordinary treatment of such cases was generally known. No less than twenty-five of the forty-two cases end fatally, a fact brought forward by all the commentators as an instance of the scientific honesty of Hippocrates, and of that dislike of anything approaching display or quackery which is seen in all his writings.

The taking of clinical histories, of which the above is an embryonic type, is now justly considered one of the most important parts of a medical education, but it is an amazing fact that, with one or two exceptions, the example thus given by Hippocrates was not followed for nearly two thousand years, and it was the revival of the practice, especially by our own Sydenham (upon whom, as we shall see, the two treatises containing these cases made a deep impression), that did most to inaugurate the clinical medicine of modern times. Still there can be no doubt that at all times the students of these writings must have had their minds directed to the importance of detailed observations of disease, and it is probably to this doctrine, that the art of healing depends, not on theory, but on observation, that Celsus refers when he says that Hippocrates first separated medicine from philosophy.

But what chiefly strikes a modern reader is the importance attributed to prognosis. The wish to know the future was strongly characteristic of the Greek mind, as is seen in their numerous oracles, and Æschylus makes the chorus in the *Prometheus* say: "It is pleasant for the sick to know clearly beforehand what pain is to come". Hippocrates, indeed, admits that it is better to cure the patient than to

tell him what is going to happen; but this, he says, is not always possible, and failing it he is the best physician who can give the most correct prognosis. The Hippocratic prognosis, however, is more than mere prophecy, it includes the entire natural history of the disease (in the literal meaning of those words), considered as a whole, and in its relation to the patient's organism. This, we must admit, is a fundamental part of medicine, for it is clearly impossible to judge the value of any treatment unless we know the natural tendencies of the disorder. And just as the revival of Hippocratic observation in the seventeenth century gave a new birth to clinical medicine, so the revival of the Hippocratic prognosis in our own days—though tending at one time to produce an exaggerated expectancy, not to say nihilism in treatment—had no small share in bringing about the more modern revolutions in medical practice.

It has been well said that great men illuminate the world by gathering into a focus the rays emanating from itself, and this is well seen in Hippocrates' third great service to medicine—his rejection of supernatural theories of disease. The age was one of transition, and the simple faith in the old mythology was giving way in all directions. Thus even the pious Herodotus ascribes the plague which fell upon the retreating Persians, not to the avenging gods of Hellas, but to the famine and hardships which they underwent; and though he considers the madness of Cleomenes an appropriate punishment for his crimes, he thinks it may have been more directly due to a habit of hard drinking, acquired among the Scythians. The famous treatise on the "sacred disease"—epilepsy—which most clearly asserts the natural origin of sickness, is not certainly genuine, but in an undoubtedly Hippocratic work, the *Airs, Waters, and Places*, we find the assertions that "no one disease is either more divine or more human than another," and that "none arises without a natural cause". The importance of this doctrine will be more apparent when we come to describe the disastrous effects

upon medical progress produced by the revival of the old theories.

Space does not permit the consideration of the *Airs, Waters, and Places*, a work in which Hippocrates founded not only historical and geographical medicine, but the philosophy of history generally;[2] or of those famous Aphorisms which were for ages classed among the most wonderful products of human genius, and the majestic introduction to which would alone suffice to immortalise its author. But the personal character of Hippocrates must not be entirely passed over. No one ever had a higher sense of the dignity of medicine; none showed greater respect for his patients; he even warns his pupils against exposing them unnecessarily during examination, or whilst operating. The great object of the physician should be to benefit his patient, or at least do him no harm, a sentiment which Galen thought at first unworthy of the master, till he learnt its value from experience. The wishes, and even the whims of the patient are to be indulged as far as possible, and a physician should rather lose his fee than trouble a sick person about it, for the memory of a good deed is better than a temporary advantage. He should also neglect no opportunity of serving the poor and the stranger, for "where the love of the art is, there is the love of man". This last quotation, indeed, is from a work of very doubtful authorship, but it expresses the spirit, if not the words of Hippocrates.

It has been suggested that, when Aristophanes mentions physicians among those who have written about the "Clouds," he is referring to the *Airs, Waters, and Places*, and that the epithet he there uses, "lazy, long-haired fops with their rings and natty nails," is an attack on the personal appearance of Hippocrates himself; if so, the Father of Medicine need not have been ashamed to be included in a satire directed against the Father of Philosophy. But we may more appropriately conclude with the words of another poet, just twenty years older than the physician,

who may have been thinking of Hippocrates when he wrote:—

> "Happy the man who studies Nature's lore!
> Him neither evil thoughts can e'er entice,
> Nor party strife of angry citizens;
> But, pure in heart and hand, he scans the face
> Of her the Immortal Mother ever young."
>
> —*Euripides*, fragment.[3]

NOTES.

[1] Arist., *Polit.*, vii. 4. "When we say the 'Great' Hippocrates we mean the physician not the man." Aristotle is only a contemporary of Hippocrates in the sense that he was born before the latter died, but the expression had evidently been long in use.

[2] See an interesting analysis and criticism of the *Airs, Waters and Places* by Dr. Clifford Allbutt, *Med. Chirurg. Journal;* vol. for 1866.

[3] Puschmann applies these lines to Hippocrates. They occur among the fragments of unknown tragedies, but are somewhat obscure and in great need of emendation.

X.—THE SCHOOLS OF COS AND CNIDUS.

AMONG the relics of ancient medical writings preserved by Cælius Aurelianus is a series of arguments by which Euryphon of Cnidus tries to show that pleurisy is an affection of the substance of the lung, but which are refuted in detail by Soranus the Methodist. Euryphon was the most prominent member of the Asclepiad school of Cnidus, and lived at, or shortly before, the time of Hippocrates. His treatment seems to have been as unfortunate as his pathology, for a certain Cinesias is described as being "thin as a skeleton, his legs like reeds, his chest still full of pus, and his ribs covered with scars from the cautery irons of Euryphon".[1]

The above indicates the leading characteristics of the physicians of Cnidus, whose grand aim and motto appear to

have been "accurate diagnosis and vigorous treatment". But, unhappily, the want of modern methods of precision caused their diagnosis to result only in a long list of doubtful diseases, and the heavy artillery of their treatment being thus fired in the dark, may have produced results often more disastrous than successful.

The Asclepiadæ of Cos, under the beneficent influence of the great Hippocrates, followed different principles. They cared more for the general state of the individual patient than for the discovery and distinction of separate diseases, and they believed, though perhaps not to the extent sometimes asserted, in the *vis medicatrix naturæ*. We must not, however, make too much of these contrasts, and historians have, perhaps, somewhat exaggerated the antagonism between the two divisions of the great medical guild. The Father of Medicine has briefly pointed out the fundamental error of his Cnidian colleagues—they neglected "prognosis". What he meant by this term has already been discussed.

For the credit of Euryphon it should be added that he is said to have introduced percussion as a means of distinguishing tympanites from dropsy, and to have first prescribed milk, especially asses' milk, in cases of phthisis. Another distinguished Cnidian was Ctesias, for seventeen years physician to King Artaxerxes II., and historian of Persia, in which work he describes the tragic fate of his fellow Asclepiad, Apollonides of Cos, who, having given immoral medical advice to the Princess Amytis, was tortured for two months, and finally buried alive.[2]

The Hippocratic writings stand in isolated grandeur at the entrance to the second great division of our subject like one of those triumphal arches of Titus or Constantine, which rise amid the ruins of ancient Rome, for the works of later physicians have almost entirely disappeared, leaving a barren interval of nearly four centuries, till we come to the days of Celsus, Pliny, and Dioscorides. Besides the works of Hippocrates, the collection comprises contributions from his pupils and other members of the school of Cos, together

with a few which may be attributed to the Asclepiadæ of Cnidus; but the following very brief outline of the medical doctrines therein contained is taken mainly from those treatises which may reasonably be ascribed to the Father of Medicine himself.

Hippocrates knows the four humours—blood, phlegm, black and yellow bile, and their corresponding four qualities —heat, cold, dryness and moisture; and he admits, with Alcmæon and the other Greeks, that diseases may sometimes be due to a predominance of one of the former. But when told that this acts by producing an excess of some particular quality, such as heat, and is to be cured by drugs which have an excess of the opposite quality, *e.g.*, cold, he demurs. The doctrine is too vague for him, he does not know which drugs are "cold" and which "hot," and thinks that such theories are best left to sophists. In their place he proposes a hypothesis of great ingenuity. May not the humours, when imperfectly or disproportionately mixed, act as irritants to the body, just as uncooked food acts as an irritant to a healthy stomach, and just as we get rid of the evils of uncooked food by cooking it, may not diseases be cured, and the humours reduced to their normal state of mixture—"crasis" —by a sort of internal coction—"pepsis"? The agent of this coction may, he thinks, be the innate heat of the body, the "thermon emphyton" of Heraclitus, but he prefers to call it "Nature". Nature, then, tends to restore the normal state, and this is often accomplished on a particular day of the disease, and accompanied by copious sweats or other excretions. Here is the famous "*Vis medicatrix naturæ*"; but shall the physician stand idle, with his hands wrapped in his chiton, while this is going on? No, by Æsculapius! let him carefully observe the aspect of the patient and his position in bed; let him use his hands to feel the temperature of his body, and his eyes to observe the character of his excretions; let him even put his ear to his chest, and he may distinguish the leather-like rub of pleurisy, or by shaking him obtain the splash of pneumo-hydrothorax.

Strangely enough, the pulse, so clearly described by the ancient Nebsecht, and so fully worked out by the later Herophilus, is hardly mentioned by Hippocrates. But having thus examined his patient, how shall the physician treat him? Let him look first to his general surroundings and see that they are at least not unfavourable, and especially attend to his diet, remembering that as uncooked food is to a healthy man, so is ordinary food to one with acute disease. Let him also use drugs, bleeding, etc., if he thinks he may thereby assist Nature in her efforts; in so doing he shall take his proper position as her servant, for "our natures are the physicians of diseases".

Hippocrates, however, is not a mere humoralist, even in this modified form, for he holds that diseases may arise also from alterations in the structures of the body, and especially from external influences, such as climate, seasons, and the like, which he sums up under the term "constitution," an idea afterwards much developed in the writings of our English Hippocrates, Thomas Sydenham; nor is he anxious to defend the above or any other hypothesis, and thinks that those who spend time in doing so only show their own volubility.

Considering the practical absence of anatomical knowledge the surgery of Hippocrates is yet more admirable than his medicine, and so high an authority as Malgaigne has declared that the treatises *On Fractures* and *On Dislocations* (*De Articulis*) are the two ablest works that were ever written by a physician; the book *On Injuries of the Head* is no less interesting, but it is impossible here to give even an outline of their contents. Blows on the temples and top of the head, says Hippocrates, are especially dangerous, and a sad illustration of this is related in the fifth book of the *Epidemics*. "The daughter of Nerios, a beautiful maiden aged twenty, was playing with a girl friend, who struck her with the open hand on the top of her head. She saw a blackness before her eyes and lost her breath, and on getting home was taken with severe fever, with headache

and redness of the face. On the seventh day there issued from the right ear more than a cupful of fœtid reddish pus, and she seemed a little relieved. But the fever returned, she became comatose and speechless; the right side of her face was drawn; spasms, tremor and breathlessness followed; her tongue and eyes became paralysed; she died on the ninth day." The surgeons of the Hippocratic age frequently incised the chest for empyema, and did not hesitate to cut down on the kidney when there was good evidence of suppuration, while in suffocative angina they even attempted to intubate the larynx.[3]

We cannot stay longer even with the greatest of physicians, but the above imperfect outline of a part of his work may suffice to show that the almost enthusiastic reverence which so many great physicians have paid to Hippocrates, was not altogether unjustified.

And his fame was not confined to physicians, nor even to Europe. The mediæval romancers classed Ypocras with Aristotle and Virgil as a great sorcerer, and delighted to tell how, in spite of his wisdom, he was beguiled by fair women into doubtful situations, and finally poisoned by his jealous wife. The Arabs adopted him as their own under the name Bucrat—Father of Crat—and an early Oriental traveller was told by an Arab doctor that no Christian nation could boast of such a physician as was Bucrat, who, he declared, was the greatest of the hakims, and lived shortly before Avicenna. Some learned authorities, as already noticed, identify Hippocrates with the great Hindu Susruta, and thus make him the father of Eastern as well as of Western medical science.

We still have far to travel through many ages and countries, but in all our future path the doctrine of the great Asclepiad will shine above us like a guiding star, dimmed indeed sometimes by the mists of theories and systems, covered at other times by the clouds of ignorance and superstition, yet still shining, and still sought for by all who have ever attempted or achieved progress in medicine.

NOTES.

[1] From a fragment of Plato, the comic poet, preserved by Galen.

[2] The *Persica* unfortunately exists only in fragments. It contains another interesting story of how the queen, Parysatis, poisoned her rival, Statira, by dividing a bird (? partridge) with a knife smeared with poison on one side, giving the poisoned half to Statira, while she ate the other to show there was no deception. Ctesias also wrote a commentary on the *De Articulis* of his great kinsman, in which he denied the possibility of permanently reducing dislocations of the hip.

[3] *De Morbis*, lib. iii.; Kühn's edit., ii. 301.

The best edition of Hippocrates is that of Littré (10 vols., Paris, 1839-61); the most convenient that of Kühn (3 vols., Lips., 1815). The "genuine works" have been translated by Adams (Sydenham Society, 2 vols., 1849).

XI.—THE SUCCESSORS OF HIPPOCRATES—THE DOGMATIC SCHOOL.

LORD BACON'S remark on the science of the ancients, that "she was old enough to talk, but not old enough to bear children," may in some sense be applied to Greek medicine. Not that the science of Hippocrates and Herophilus, of Heraclides and Soranus, was sterile, far from it; some of her sons might have justified the boasts of the Mother of the Gracchi; but she certainly did an immense amount of talking. The ancient Greek loved talking; his mind was more philosophical than scientific, and he preferred to speculate on things in general rather than to investigate particular facts. His failure in medicine, so far as we dare call it a failure, was thus due to causes the very opposite to those which produced the downfall of the art in ancient Egypt. A Hippocratic writer had said: "The physician who is also a philosopher is godlike". This became the motto of the dogmatic school, was made the excuse for an immense amount of useless speculation, and was finally taken as the text of a special treatise by Galen himself. But there were

two more direct sources for those floods of theory which spoilt the fair promise of the Hippocratic harvest—the Court physicians, and the philosophy of Plato.

The supposed founders of dogmatism, the sons of Hippocrates, Thessalus and Draco, seem to have been both employed at the Macedonian Court, and the interest taken in medicine by the successors of Alexander is notorious. We need only mention Attalus, of Pergamus, who planted the first poison garden, and invented a lead plaster; Nicomedes, of Bithynia; Mithridates, of Pontus, the most famous of toxicologists; and, above all, the Greek kings of Egypt. All these monarchs seem to have delighted in medical discussions, and doubtless those physicians who could bring forward the most numerous and plausible theories would be most likely to obtain their favour.

A still more important influence was that of Plato, who, though the noblest of philosophers, has hardly deserved well of the profession of medicine. A Court physician, whose livelihood depended on his being always able to render a reason to an inquisitive but royal amateur, may be pardoned if he sometimes went to his imagination for his facts; but when a philosopher, whose only object is the discovery of truth, and whose great master was never weary of asserting his own ignorance, spins a huge cobweb of absurdities out of his inner consciousness, and imposes it upon mankind as the reality of nature, he is less excusable. Plato had a low opinion of physicians, and declared that if they could not cure their patients quickly they were worse than useless, for they only prolonged lives worthless to the State.[1] By his philosophy he added injury to the insult, and we shall find the Platonic physiology, sometimes in its own shape, sometimes in the yet more ghostly form of Neoplatonism, turning up again and again as the evil genius of the healing art. Few now read the *Timæus*, but, next to the Homeric poems, it was probably the most popular of Greek writings; it had countless commentators; Cicero himself translated it into Latin, and together with

the Hippocratic treatise, *On the Nature of Man*, it seems to have formed the physiological text-book of the dogmatic physicians. Nor is it without value, even from a medical standpoint; Plato was acquainted with the writings of Hippocrates, and recognises the healing power of nature, declaring that "every form of disease is in a manner akin to the living being, whose complex frame has an appointed time of life," and that, in treatment, regimen is always to be preferred to drugs; but we need not attempt an abstract of the work, for it can be read by all in the English of Professor Jowett. The treatise *On the Nature of Man* is ascribed by Aristotle to Polybus, son-in-law of Hippocrates, and contains the humoral pathology in its most typical form, but an account of these doctrines will be best given when we come to speak of Galen, by whom the dogmatic theories were pruned into a definite system. Meanwhile, we may take the following description of medical dogmatism from the writings of our own Cullen: "Every wise physician is a dogmatist, but a dogmatic physician is one of the most absurd animals that lives. We say he is a dogmatist in physic who employs his reason, and from some acquaintance with the nature of the human body thinks he can throw some light upon diseases, and ascertain the proper methods of cure. On the other hand, I call him a dogmatical physician who is very ready to assume opinions and to be prejudiced in favour of them, and to retain and assert very tenaciously and with too much confidence the opinions and prejudices which he has already taken up in common life as in the study of the sciences."

Galen gives as the leaders of the Dogmatic, or as he prefers to call it, the Rational school, Hippocrates, Diocles of Carystus, Praxagoras of Cos, and the great Alexandrine anatomists. Diocles was classed in antiquity second both in age and rank to Hippocrates, but, unfortunately, we know little about him. He saw the danger of too much theory, and warned his colleagues against trying to explain everything; he devoted much time to anatomy, probably that of

animals only; and carefully investigated the development of the embryo. Three inventions long survived under his name: a bandage for the head, a surgical instrument which we shall notice shortly, and a remedy for toothache containing opium, galbanum and pepper. He further distinguished pleurisy from pneumonia, and declared that fever was not a disease but a symptom.[2]

Praxagoras of Cos, the tutor of Herophilus, was a true dogmatist, and maintained the existence of no less than eleven different humours. He is also said to have first distinguished the arteries from the veins, and to have asserted that they contain air only, though both the discovery and the theory have been claimed to be of older date, and, as we have seen, were not unknown to the Egyptians.[3] Of special interest is his treatment of intestinal obstruction, for which Diocles had proposed lead pills, apparently on the same principle that has caused metallic mercury to be given in recent times. Cælius Aurelianus tells us that after the failure of purgatives, enemata, emetics, and rectal injections of air, Praxagoras recommended massage of the abdomen, and finally laparotomy, *dividendum ventrem*, removal of the obstruction and suture of the intestine, *atque detracto stercore consuendum dicit (intestinum)*. It is, however, doubtful whether he actually performed the operation, or only recommended it as a counsel of perfection.[4] Cælius further relates that Praxagoras had a slave who ate six pounds of bread daily without satisfying his appetite, which is probably the earliest recorded instance of bulimia, or abnormal hunger.

With all their faults, the Dogmatists were upon the right road; they saw that a science of medicine must be based upon physiology, and their error, which was almost unavoidable, was the attempt to erect a complete edifice before there were materials suitable or sufficient for the foundation. The theory of disease, or perverted vital action, forms the most difficult division of the most complex of the physical sciences, yet circumstances demanded that it should

be attacked first, and the marvel is, not that the old physicians failed, but that they came so near to the truth. If the Dogmatists missed their mark, they at least aimed high, and it is they, and not the Empirics, the Methodics, or even the Eclectics, who are the truest sons of Hippocrates, the most legitimate fathers of modern medicine.

NOTES.

[1] *Republic*, iii. Plato admits that there ought to be good physicians in a State, but makes the curious suggestion that "they had better not be robust in health, and should have had all manner of diseases in their own persons". Though he mentions Hippocrates with respect, his two notices of him are not entirely without what looks like sarcasm; thus, in the *Protagoras*, Hippocrates is introduced as a distinguished doctor who receives pay for his teaching, which was a favourite accusation against the Sophists; while in the *Phædrus*, when the physician's authority is invoked, Socrates is made to reply: "Yes, but must we not compare reason with Hippocrates to see if they agree?"

[2] Some of the works of Diocles seem to have been extant in the thirteenth century, for John Actuarius has copied from him the following receipt for a laxative medicine. Take 30 figs, 24 drachms of soda, 15 drachms of false saffron seed (*carthamus tinctorius*), rub up the whole with honey, and divide into 30 parts, one to be taken daily before dinner.

[3] Praxagoras, says Galen, "shamelessly asserted that the arteries end in nerves," an error which was repeated by Aristotle, and revived in the sixteenth century by Cesalpino.

[4] Cæl. Aur., *Acut.*, iii. 17.

XII.—THE ALEXANDRINE ANATOMISTS.

When Ptolemy I. established the "Museum" of Alexandria, about B.C. 300, he made that city the centre of Greek science, including medicine, a position which it maintained for nearly a thousand years, so that, even in the fourth century A.D., to have studied at Alexandria was a sufficient recommendation for a young physician in any part of the Roman Empire.[1]

The earliest members of the school, Herophilus and Erasistratus, were among the greatest it produced, and they carried the science of human anatomy to the highest point then attainable. There are, indeed, traces of this study in older times, but these may safely be dismissed in the language which Thucydides applies to the deeds of the earlier Greeks: "Little is known of them, but they were probably no great things". Nor is it necessary to revive the discussions, dating, perhaps, from classical times, as to which particular discoveries are to be attributed to each of the great anatomists. Both investigated the nervous system, traced the origin of the nerve trunks to the brain and spinal cord, and distinguished sensory and motor branches, though they perhaps sometimes mistook tendons for the latter. Both described the coverings of the brain, and Herophilus traced the sinuses of the "dura mater" to their meeting point, which is still known by the name he gave it, the "wine press," or "torcular" Herophili. He also gave an account of the ventricles of the brain, especially the fourth, with its "calamus scriptorius," and believed, like some modern physiologists, that it was the special seat of the soul. Both seem to have noticed the lacteals, for Erasistratus says that the mesenteric arteries sometimes contain milk instead of "vital spirits," and Herophilus asserts that some veins of the mesentery end, not in the portal vein, but in glands. The latter also described and named the hyoid bone,[2] the duodenum, and the prostate gland, and made a very careful study of the eye, thereby greatly improving the old operation for cataract, though the assertion that he first extracted the lens instead of merely depressing it seems unwarranted. Erasistratus investigated the anatomy of the heart, with its valves and chordæ tendineæ, while Herophilus is said to have made the first *post-mortem* examinations, at some of which King Ptolemy himself was present.

. Both were physicians as well as anatomists, and here
fered widely. Herophilus maintained the humoral
and revered Hippocrates, in so much that when

obliged to contradict him he always avoided mentioning his name. His tutor, Praxagoras, had first shown the importance of the pulse, to which Herophilus devoted great attention, comparing the different varieties to the rhythms of music, and giving them special names, one of which, the leaping or goat-like pulse (*pulsus caprizans s. dicrotus*), still survives.[3] He also wrote on the causes of sudden death, attributing it to paralysis of the heart, and noticed a case of its occurrence during the extraction of a tooth. He put a high value on drugs, which he called "the hands of the gods," and used them in great variety. When asked what was the best quality of a physician, Herophilus is said to have replied: "The power to distinguish the possible from the impossible".

Erasistratus, on the contrary, rejected the humoral doctrines, and founded a system of his own, based on the theory that the arteries contain air or "vital spirits". To meet the obvious objection that these vessels bleed when injured, he assumed the existence of communications between them and the veins, closed normally, but allowing blood to enter the arteries as soon as the air escapes. Noticing that wounds are often followed by inflammation, he assumed that this also was due to a passage of blood into the arteries, and that when it involved the larger vessels it produced fever. The great cause of inflammation, fever, and disease generally was, he considered, an overfulness of the veins, or "plethora," which compelled some of the blood to pass through into the arteries. Yet, strangely enough, he entirely rejected bleeding, treating his patients by low diet, and by bandaging their limbs with the view of closing the communications by pressure. This horror of venesection he probably acquired from his teacher, Chrysippus, of Cnidus,[4] who had spent sixteen months with the Egyptian priests, and had learnt from them the doctrine that "the blood is the life," or, as Chrysippus called it, "the food of the soul". His medicines were of the mildest character, consisting of laxatives, barley-water and wine, which last he gave in homœopathic doses,

beginning with three drops and gradually increasing. This, however, was not due to any timidity, if we may believe the story that Erasistratus was in the habit of cutting down upon the liver and spleen, and applying his drugs directly to the surface of those organs. He rejected the operation of tapping the abdomen in dropsy, for he declared it did not affect the origin of the disease, which was usually an affection of the liver, a fact which he may have discovered by means of *post-mortem* examinations. Finally, Erasistratus invented a catheter, though probably not the first instrument of that nature. The followers of both the great anatomists formed "schools," which lasted more than three centuries, and Galen directs two of his treatises against the Erasistrateans and their anti-venesection principles.

The development of anatomy would naturally be followed by improvements in surgery, and that this was the case may be seen by comparing the condition of the art described by Celsus with that found in the Hippocratic writings. The advance of mechanical knowledge tended in the same direction, and the wonderful inventions by which Archimedes defended Syracuse against the Romans were more successfully employed by the surgeons of Alexandria. The endless screw proved especially useful, while the "trispaston," a contrivance for dragging ships on shore, was adapted by Pasicrates to the reduction of dislocations, and was soon to be found in every respectable gymnasium. The learned leisure of the medical occupants of the museum was further employed in devising new and complicated modes of bandaging, and the majority of our existing methods are probably only survivals of the fittest of those then invented.

The various operations introduced at this time will be more conveniently discussed when we come to the golden age of Greek surgery, the days of Antyllus, Heliodorus, and Archigenes, but, in conclusion, we must not shrink from examining a painful and discreditable aspect of the Alexandrine medicine. It is said that the Ptolemies, in their zeal for science, over condemned criminals to Herophilus and Erasis-

tratus, and that the latter opened the various cavities of their yet living bodies, in the hope of making important physiological discoveries. Modern writers have attempted, though with scanty success, to discredit this story; antiquity never doubted it. Celsus, while condemning the practice, adduces arguments to defend it, but we may well hope that Tertullian exaggerates when he puts the number of the victims at 600. Nor are we without somewhat similar instances in modern times. About the year 1550 the Duke of Tuscany handed over a condemned criminal to the medical faculty of Pisa, "to kill after their own fashion, and anatomise". Fallopius gave the unfortunate man two large doses of opium, but it may be questioned whether any one would have interfered, even had he followed the supposed example of Herophilus.[5] Were not tortures equally great daily inflicted in the names of law and religion? The same stories have been told of great artists, Parrhasius and Michael Angelo, who are said to have tried in this way to obtain models of the suffering Prometheus, and—*horribile dictu!*—the crucified Saviour. Such tales, however, might readily be manufactured, and we may perhaps still venture to hope that they are all equally false; but there can be no doubt that experiments of the effects of poisons and antidotes were frequently made upon condemned criminals by Greeks, Arabs, and even Christians.

NOTES.

[1] Am. Marcellin., xxii. 16.

[2] He called it the "parastate" bone from its relation to the tonsils.

[3] The name seems derived not so much from the leaping of the goat, as from the way that animal rises to its feet, giving first a large heave with its hind legs and then a smaller one with its fore limbs; corresponding to the double beat of the dicrotic pulse.

[4] Pliny says that Chrysippus "changed the opinions of physicians by his immense garrulity," but he seems to have confounded him with a later Chrysippus, a stoic philosopher, who wrote 705 treatises.

[5] *De Tumoribus*, 14; for a discussion of the alleged vivisection of human beings in the sixteenth century see app. vii.

XIII.—HERACLIDES AND THE EMPIRIC SCHOOL.

SOME readers may have found the name Heraclides, mentioned among typical Greek physicians in a preceding article, rather strange to them, but in Heraclides of Tarentum, Heraclides the Empiric (B.C. 230), we may, I think, find an almost forgotten hero of medicine, some of whose claims to remembrance shall here be briefly repeated. His works have perished—our relics of ancient literature are by no means survivals of all the fittest—and what we know of him is gathered from scattered notices in later writers. Galen calls him "a most excellent physician," giving him the high praise that he never preferred his party to the truth, and Soranus considered him the only Empiric worth refuting; had he not been in his grave for three centuries, he might have given the great Methodist something more to do. But Heraclides was not fond of controversy, and his lukewarmness in that respect led him to be accused of relapsing into dogmatism. He did not, like Serapion, seek notoriety by abusing his colleagues, or by introducing some new and startling remedy which should excel the virtues of tortoise blood or crocodile dung, but devoted himself to the humbler task of weeding the already over-luxuriant garden of Empiric medicines. This he did in his greatest work, *On the Preparation and Proving of Drugs*, which he declared, in the best spirit of Empiricism, contained nothing but what he had himself observed, and which formed a rich mine for all future writers on *materia medica*. In this treatise Heraclides seems to have first pointed out the great value of opium, and to have defined the indications for its use. That drug, indeed, was, as we have seen, probably used from the earliest times, and though only once mentioned in the Hippocratic writings, was employed by Diocles (B.C. 350) as a remedy for toothache, and is noticed by his contemporary Diagoras, who asserts that it acts injuriously on the special senses, and is, therefore, to be avoided in affections of the eye and ear. Heraclides, however, disregards

this, and recommends poultices containing the drug in painful ophthalmia. We have also prescriptions of his containing opium for cases of sleeplessness, spasm, cough, "cholera" and colic, and one with a large dose of the drug for patients bitten by venomous serpents. His treatment of "brain fever," or phrenitis, of which he distinguished a cerebral and gastric form, was much praised, and consisted of a darkened room, cold to the head, bleeding and enemata; while, in opposition to the dominant school, he declared that in acute fevers fluids are not to be withheld from the thirsty sufferer. He was scarcely less distinguished as a surgeon, asserted the possibility of reducing dislocations of the hip, and invented a machine for that purpose; indeed it seems highly probable that it was Heraclides who first conceived the idea of utilising the mechanical inventions of his contemporary and neighbour, Archimedes, in surgery. He also invented a method for separating the eyelid from the ball, when adherent after injury, which was practised for many centuries. Two works of more general interest, *On Cosmetics*, and *On Diet in Health* (Symposium), are attributed to Heraclides, both of which are said to have been the first of their kind. From the former Galen has extracted two recipes "for making the hair stick together," the first consisting of wax, pitch, glue, and gum-mastich, equal parts, to be warmed before using. Did the ancient Greeks wax their moustaches? For incipient baldness, Heraclides recommends a pomade of anemones rubbed up in oil, which he says will also darken the hair. Among the scanty extracts which survive from the Symposium, we may notice the assertion that sheep's trotters, snails, and other glutinous substances cause indigestion if taken in excess, and that it is always well to eat a little before drinking. Finally, this prolific author wrote commentaries on several Hippocratic works, where, in contrast to other Empirics, he showed due respect to the memory of the mighty Asclepiad, and he has received as an appropriate reward the honourable mention of his successors of every school.

To pass to the sect of which Heraclides was the greatest ornament; Empiricism is now a by-word and a reproach in medicine, but the system primarily so called owed its origin mainly to the teaching of one whose name on the great roll of the Asclepiadæ precedes even that of Hippocrates, the most scientific of the Greeks, the grandest intellect, perhaps, of the human race. Aristotle, son of the Asclepiad Nicomachus, probably studied medicine in early youth, and may even have practised it; his anatomical discoveries are worthy to be compared with those of Herophilus and Erasistratus, and his teaching, which brought down the philosophy of Plato from heaven to earth, from the ideal to the real, made it at least more suited for that art which deals with human bodies. As the result, partly of this teaching, partly of the sceptic philosophy taught about the same time by Pyrrho, and partly of the natural reaction against the extravagant theorising of the Dogmatists, there arose at Alexandria, about 280 B.C., the Empiric school of medicine, of which the more direct founders were two pupils of Herophilus, Philinus and Serapion. Of these the former argued with the Dogmatists, and the latter abused them, not sparing even Hippocrates himself. Indeed, Serapion seems to have been a sort of Greek Paracelsus, and, like the notorious German, is said to have introduced an important mineral remedy into medicine, and to have first used sulphur in chronic skin diseases. The Empirics, though a branch of the Alexandrine school, despised anatomy. They even wrote treatises to prove its worthlessness, and we may well fancy Serapion exclaiming, in the language of Paracelsus: "What is the use of knowing the shape and position of the brain and liver, or whether there are such things as brains and livers at all?" No less did they reject the Dogmatic physiology and pathology, and one of their favourite mottoes was: "It is not the cause, but the cure of diseases that concerns us; not how we digest, but what is digestible". In short, they reduced the whole art and science of medicine to a system of therapeutics. A person is ill, that is, he has

certain unpleasant feelings or symptoms; surely the first thing to do is to find something which will remove them, and the whole duty of the physician is to discover what particular treatment, and especially what drugs, will get rid of particular sets of symptoms. This he may do in three ways: (1) By his own observations and experiments—autopsy; (2) by learning from his contemporaries and predecessors—history; (3) in the case of new and strange diseases, by drawing conclusions from those most similar to them—analogy. Thus was established the famous "tripod" of the Empirics, but being found rather shaky on its three legs, a fourth was afterwards added, "epilogism," or the process of inferring preceding events from the present symptoms. Thus, by epilogism, the consistent Empiric might conclude from the extreme inflammation of a wound that it was poisoned, and treat it accordingly without falling into the Dogmatic heresy of looking for hidden causes. Empiricism practically resolved itself into a search for specifics, and its immediate result was the introduction of a great number of drugs, some of very extraordinary nature, such as hare's heart, camel's brain, the flesh of weasels, and of human beings, and the two examples given above; but doubtless there was ample evidence, both from "autopsy" and "history," of patients recovering after taking any of them.

It has been said that the besetting sin of men of science is to fancy they have finished off all things in heaven and earth by giving them names. The Empirics, says Galen, were "terrible men for names," and in this they were encouraged by Aristotle, who was not only the father of natural science, but had other offspring, one of whom sprang from his marvellous brain a full-grown Pallas Athene. This was logic, and its definitions and syllogisms were seized upon with delight by the physicians of the day, who soon showed that as much mental energy could be wasted in word-splitting, definitions of the pulse, etc., as in the vaguer speculations of Dogmatism.

The Empirics existed as a separate school for some centuries, and we shall find one of them among the teachers of Galen; but they finally separated into two distinct branches, one philosophical, and culminating in the sceptic agnosticism of Sextus Empiricus; while the other, or practical branch, gradually degenerated into Empiricism in its modern sense, and found its chief exponent in Marcellus the Empiric, in whose writings human credulity in matters medical seems to have achieved its utmost. Curiously enough, these two are almost the only members of the sect of whose works we possess more than fragments, and they may be considered in greater detail hereafter.

Meanwhile, let us remember that the Empiric school was useful in its generation in checking the extravagances of Dogmatism, and in extending and defining the use of such remedies as opium and sulphur, and, above all, that it produced one great physician worthy to stand with the noblest round the Hippocratic throne, Heraclides of Tarentum.

NOTE.

The "sources" for this and the two former chapters are mainly scattered passages in Celsus, Pliny, Cælius Aurelianus and Galen, especially the last named. Fragments of the Symposium of Heraclides are preserved by Athenæus, *Deipnosophistæ* (*passim*). The preface to the *De Medicina* of Celsus contains a brilliant criticism and comparison of the Dogmatic and Empiric "schools".

XIV.—MILITARY MEDICINE IN ANCIENT GREECE.

Dr. H. Fröhlich, whose interesting essays on Homeric medicine have already been noticed, has come to the conclusion that the poet himself was nothing less than an army geon. This will probably add another to the many dised Homeric questions, but we will not venture to discuss

it here; nor need we repeat what has already been said about the surgeons who followed Agamemnon.

In Greece itself we naturally look for our earliest information to the great military State, Lacedæmon, and among the laws ascribed to Lycurgus was one which provided that army surgeons should retire to the rear of the right wing during a battle. Xenophon also says that the medical men who accompanied the Spartan armies shared the same tents with the "peers," the flute players, the priests, and any volunteers who might be present, which seems highly respectable company. We have, however, no information as to who these surgeons were, or what the nature of their qualifications, and indeed know curiously little about the physicians of Greece proper as distinct from her colonies. But not impossibly some of the youth of Sparta may have found the law of Lycurgus respecting surgeons more attractive than that ordinance which forbade the men of Laconia to retreat when in face of the enemy.

One of the oldest authentic records of Greek military medicine dates from the period of the Persian wars, about B.C. 450. This is an inscription found at Dali in Cyprus, the translation of which has much exercised philologists. We learn from it that when the men of Idalion went forth to repel an inroad of Persians and Kitians, a certain physician, Onasilos, and his pupils (or brothers?) went with them and tended the wounded free of charge; wherefore the Demos decrees that rewards shall be given (1) to Onasilos and his pupils, (2) to Onasilos himself separately. In each case money and lands are mentioned, but for some reason they are not to have both, and the amounts given cannot be translated. The rest of the inscription is very imperfect, but from its conclusion we gather that Onasilos received a landed estate, free from taxes, for himself and his heirs.

Such volunteering appears to have been frequent in later times, for a Hippocratic writer advises the young surgeon to seek opportunities of following a military expedition, and remarks that there are works specially devoted to army sur-

gery. It may have been on such an occasion that Diocles invented his graphiscus, a spoon-like instrument for extracting embedded weapons, afterwards much used in the Roman army.

An ancient though spurious document declares that Hippocrates sent his son Thessalus with the expedition to Sicily. "When you were consulting about a surgeon to accompany the expedition," says the imaginary Thessalus, who is supposed to be addressing the Athenians, "my father offered to send me, to fit me out at his own expense, and to ask no pay till the expedition started." May we venture to conclude from this that at the time of the writer there was a paid army medical service, and that this payment was, in the case of pupils, given to their masters? The mention of one surgeon for the whole expedition, however, makes us suspect that the account is entirely imaginary.

The immortal Ten Thousand seem to have been accompanied by at least eight surgeons, for Xenophon says that they "appointed" this number on one occasion to look after the wounded. Elsewhere we read that the general Cheirisophus died after taking an anti-febrile potion. But neither of these passages is conclusive, for the persons appointed may not have been regular surgeons, and the death of Cheirisophus was, perhaps, the natural result of an attempt at self-medication. They certainly had nothing in the shape of an ambulance, the wounded being carried upon the backs of their comrades, one of whom was caught trying to bury his burden before he was quite dead. Xenophon ordered him to be publicly scourged, for which he afterwards accused the general of undue severity before the tribunal of the army. The soldiers, however, decided that he had not been beaten enough.

Xenophon's account of military medicine in the *Cyropædia* may be more safely taken as the ideal of an experienced general as to what such a service should be, than as a true picture of anything actually existing in Persia in the sixth century B.C. Cyrus, the model king and commander,

is made to say that, having seen and heard how cities which care for the health of their inhabitants elect public physicians, and how generals take surgeons with them for the benefit of their soldiers, he has made it his first object to provide his army with the most skilful practitioners he could find; and he afterwards employs their services not only for his own wounded but also for those of the enemy. In the *Hellenica* the historian tells us that the Thessalian prince, Jason, attached his mercenaries to his service by the care with which he had them tended in sickness, as well as by high pay and presents. The well-known story of the death of Epaminondas shows that there were surgeons present in the Theban army at Mantinea.

In the Macedonian age historians, unfortunately, give us only anecdotes, as, for instance, of the surgeon who extracted an arrow from Philip's eye, or of that other practitioner who received the flattering token of confidence from Alexander the Great. It is indeed pleasant to learn that the king so trusted his physician as to drink the supposed poison, while holding in his hand the accusation against him, but we should have been glad to have also heard something of the arrangements for the wounded of that army which conquered Western Asia, and which was accompanied by the most celebrated practitioners from all parts of Greece. Besides Alexander's own physician, Philip of Acarnania, we hear of Callisthenes of Olynthus, whose outspoken criticism of the king's claims to adoration cost him his life, Critodemus the Asclepiad of Cos, Glaucias, who was crucified for failing to cure Hephæstion, Pausanias, Alexippus, and others. Callisthenes wrote a history of the expedition, which may have contained interesting medical details, but only a few fragments have survived.

Finally, when Sparta fought her last battle for the freedom of Hellas, and saw her warriors driven in no ignoble defeat from the hill of Sellasia, we are told that every house opened its doors, and that all who were left in Lacedæmon united in refreshing the soldiers and binding up their wounds.

Thus the story of the military medicine of independent Greece ends with the city whence it began, but we shall soon find Greek surgeons actively employed in Roman armies, and on reaching that wider development of Hellenic civilisation known as the Byzantine Empire, shall come upon an army medical service such as Lycurgus never dreamt of, and not unworthy to be compared even with that of modern times.

NOTE.

Xenophon, *De Republ. Lacedæm.*, xiii. 7; *Anabasis*, iii. 4-30, v. 8; *Cyrop.*, i. 6-15, iii. 2-12; *Hellenica*, vi. 1; Justin, xxviii. 4, 5; Hippocrates, *Epistles* (Kühn's edit.), iii. 844, and *De Medico*, i. 65.

Moritz Schmidt, *Die Inschrift von Idalion und das cyprische Syllabar*, Jena, 1874; Fröhlich, *Die altgriechische Militärmedicin der Nachhomerischen Zeit.* in *Rohlfs Archiv*, 1879.

XV.—THE MEDICAL PROFESSION IN ANCIENT GREECE.

PHYSICIANS in Greece, though classed among the artisans, held from first to last, from the days of Homer to the fall of Constantinople, an honourable position in society. Even Plato, the despiser of medicine, introduces a physician into the highly aristocratic assembly of his Symposium, and Herodotus attributes to their influence two of the most important events of antiquity, the conquest of Egypt by Cambyses, and the invasion of Greece by the Persians. We have already seen how medical practitioners were valued in Homeric times; in the story of Democedes, we found cities competing for their services and outbidding one another in liberality, and similar evidence is derived at a later period from the decrees in honour of those who have deserved well of the State, a notable proportion of which mention physicians. Thus an inscription, dating from the beginning of the fourth century B.C., found on the Athenian

Acropolis, declares that "since Evenor the physician had aforetime shown good-will to the city and people, and had made himself useful by his art, healing many, both citizens and strangers, and now, having been chosen inspector of drugs, had spent a talent (£240) in that office, it seemed good to the Demos to praise Evenor, son of Evepios the Argive, and to crown him with a crown of green olive for his good-will to the people of Athens, and that he be an Athenian and his descendants, and that it be lawful for him to enter his name on the list of whatever tribe he pleases, and that this decree be engraved on stone and preserved on the Acropolis".[1] Another inscription of somewhat later date found at Carpathos tells us that Menocritus the Samian had been public medical officer at Brykountii more than twenty years, during which period he had been distinguished for zeal and devotion in tending the sick, and had borne himself blameless both in public and private. On the occasion of an epidemic he had rendered special services, had never hesitated to attend patients even outside the city, and had refused payments to which he was justly entitled. Wherefore, "that the people of Brykountii may show themselves grateful, and honourers of good physicians," they decree that Menocritus is worthy of praise, that he shall have a gold crown, and a seat of honour at all their festivals, and that this decree shall be read publicly at the games of Æsculapius, and be engraved on a pillar in the temple of Poseidon.[2]

Even private patients might go so far in their gratitude as to set up inscriptions in honour of their medical attendants, as did the Athenian, Batakes, to his doctor, Argæus, who had cured him of rheumatism. The inscription, dating from the first century B.C., still exists, and comprises an elegiac poem to the following effect:—

If ever mortal by wisdom discovered ought worthy of honour,
Surely, Argæus, 'tis thou, O man of marvellous mind:
Thou who hast gathered from books the learning and lore of physicians,

Thou who dost heal with sweet wine wearisome pains in our joints.
Wherefore the fame of thy art shall live through the ages to follow,
Passing in brightness the stars, shining for ever on high.
—*Corpus inscriptionum Atticarum*, iii. 779.

Argæus seems to have belonged to the sect of "wine doctors" (*οἰνοδόται*), who flourished greatly at this period.

An epigraph found in the island of Cos tells us that "the people of Isthmus honoured with triple honours Satyrus, son of Themistocles, the physician, and bestowed on him a crown, value fifty gold pieces (£40), and a bronze statue, because of his skill in his art and his good-will towards the Demos".[3] Satyrus was probably a native of Cos, and perhaps an Asclepiad, but the great majority of the practitioners mentioned in these inscriptions are foreigners, for the physician, like the prophet, seems to have had no honour in his own country.

In later times such records become more common but less valuable, for a physician so fortunate as to cure an Antiochus or a Ptolemy was sure to have the freedom of numerous cities laid at his feet. These honours are sometimes mentioned on their tombstones, of which a considerable number have survived, some describing the physician's virtue and skill, others the grief of his relatives and friends, while some show a tendency to that scepticism which has always been attributed to the profession. Thus the physician Nicomedes chose as his epitaph: "I was not, and I became; I am not, and I sorrow not".

In ancient Greece any one might practise medicine who thought himself qualified to do so and could find patients, but to get a State appointment, he must not only have become distinguished in his profession, but, in Athens at any rate, had to give an account of his teachers and course of education before the Assembly. Practically, every physician began as an apprentice, often to his own father, for medicine, [illegible]ore than any other, has always been an inherited [illegible]l practitioners, however, would natur-

ally attract numerous followers, and thus "schools" arose in various places—Croton, Cyrene, Rhodes, Cos and Cnidus, till all were superseded by Alexandria. Aristotle distinguishes three classes of physicians—ordinary practitioners, teachers of the art, and amateurs, which last were probably very numerous, for the cultured Greek prided himself upon taking all knowledge as his province.

Having finished his education, the young doctor went on his travels, and settled down in any city which seemed to offer a favourable opening; nor was he ignorant of the plan of working up a practice by treating the poor gratis. In an inscription of the year 304 B.C. the Athenian Assembly decrees that Pheidias, son of Apollonius the Rhodian, is to be praised and crowned because, "to show his good-will to the city," he volunteered to act as public medical officer without pay. We should probably do no injustice to the worthy Pheidias by supposing that he may have some other object besides the one mentioned in making this generous offer.

Some further attempted to advertise themselves by exaggerating the Hippocratic rule as to elegance of dress and suavity of manner, thereby incurring the ridicule of the satirists, and we hear of no less than four Athenian comedies called "The Doctor," though, unfortunately, little more than their titles have survived. The prosperous physician trained his slaves to act as assistants, and to treat patients of their own class, which they did, according to Plato, in a very rough and ready manner. But slaves might also doctor freemen, for Diogenes tells his master that he ought to obey him though a slave, since even freemen obey slaves when they are physicians or pilots, and a philosopher is better than either. These slaves sometimes purchased liberty by their earnings, and we have an inscription in which such an one agrees to continue as his former master's assistant for a period of five years, in return for his board, lodging and clothes.[4]

In the *Protagoras* Plato incidentally tells us how the phy-

sician began to examine his patient: "He looks at his face and the tips of his fingers, and then he says, 'Uncover your chest and back to me that I may have a better view'". According to Xenophon, diligent practitioners visited their patients morning and evening, and Galen says that, when at Rome, he went twice a day into the country to see a case of ophthalmia, from which historians have concluded that his practice must have been a very poor one. With regard to fees, classic writers, unfortunately, only give extraordinary cases, such as Pliny's story of the £24,000, which Ptolemy is supposed to have paid Erasistratus, or Cleombrotus, but scattered passages in the comic poets seem to indicate that the usual fee for advice and medicine varied from one to two drachmæ (nine to eighteenpence). Sometimes a patient remembered his physician in his will, as did the philosopher Lykon, who bids his heirs "satisfy" his two medical attendants, "who deserve it and more for their zeal and ability".[5] Hippocrates, as we have seen, urged his pupils not to be over-eager for gain, but this warning was naturally often disregarded, and we hear of physicians who never opened their mouths without requiring to be paid for it, and whose first dealing with their patients was always to arrange about the fee. The beautiful Aspasia, of Phocæa, when a girl was horrified by the appearance of a tumour under her chin. A physician was sent for, but, though the girl's parents were poor, he refused to undertake the case till he was paid three staters (about forty-five shillings) on account.[6]

Next in importance to the physician is his office, the Iatreion, which was at once surgery, dispensary, and consulting-room, and which in later times became, like the gymnasia and barbers' shops, a favourite lounging place for idlers. Here the physician gave advice, performed operations, compounded medicines, and sometimes even received resident patients. Every large city also had its public Iatreion, which, as we learn from an inscription found at Delphi,[7] was in some cases supported by a special tax. We have no evidence as to whether these institutions received in-patients,

but it would certainly have required very little to convert the free dispensary into a rate-supported hospital.

Some writers consider that a still closer approach to this was made by a building near Athens called the Pæonium; but our only information about it, a fragment of a comedy preserved by Athenæus, hardly bears out this idea. Two Athenian dandies are discussing what they should do if there were no such conveniences as slaves. "I (says one) will rig up a mechanical arrangement like they have at the Pæonium, down on the sea-shore; hot water brought on arches will run straight into the bath, and stop when you tell it to; scent box, sponge and sandals will come in of their own accord." From this we may perhaps conclude that the place was a well-appointed hydropathic establishment where an exhausted Athenian "masher" could recruit himself with a bath, probably on paying a reasonable number of obols.

Women, as in Homeric times, had a share in medical practice. The mother of Socrates was "a midwife brave and burly," and a sister of the sceptic philosopher Pyrrho belonged to the same profession, which, as Plato tells us, was confined to elderly and experienced matrons. They probably practised widely among their own sex, for in the "Hippolytus" the nurse tells Phædra that if her disorder is one which cannot be revealed to men there are women who understand those matters.

These facts are alone sufficient to show the mythical character of the story of Agnodice, which is sometimes repeated as though it were sober history. The Athenians, says Hyginus the fabulist, thought so highly of medicine, that they forbade women and slaves to practise it; whereupon many women died through excessive modesty. This induced a certain Agnodice to assume the dress of a man, in which guise she learnt obstetrics from the physician Hierophilus, and afterwards by revealing her sex to her patients acquired an immense practice in that department. Her male colleagues out of jealousy accused her before the Areopagus of corrupting women, but by declaring herself

she obtained both her own acquittal, and the repeal of the law. The names Agnodice (holy law) and Hierophilus (which there is no good reason to convert into Herophilus) seem to indicate that the story is an allegory. The only profession open to women was a certain department of medicine. It is clearly just and right that this should be so, and some ingenious person probably invented the above story to account for it. Women in Greece, as in all ages and countries, doubtless did much noble if unnoticed work as nurses. "You know (says Demosthenes) how valuable a wife is to a man when he is ill."

NOTES.

[1] Rhangabe, *Antiq. Hellen.*, No. 378.

[2] Wescher, "Texte et explication d'un Decret en Dialecte Dorien," *Revue Archeologique*, 1863, p. 470.

[3] Paton and Hicks, *Inscriptions of Cos*, No. 408. For other inscriptions in honour of physicians see *British Museum Insc.*, Nos. 143, 258, 364; *Corp. Ins. Græc.*, 1897, 3596, 4315*n*, 6265; *C. I. A.*, ii., No. 256*b*, iii. 779; Perrot, *Exploration de la Galatie*, No. 27; Ahrens., *Philologus*, 35, 28; Le Bas, *Voyage Archeologique*, v., Nos. 161, 314, 568, 1336.

[4] His name was Damon, and he paid six minæ (about £24) for this partial freedom, about double the average value of a slave at the period (second century); Wescher, *Inscriptions à Delphes*, No. 234.

[5] See the *Life of Lykon* by Diog. Laertius.

[6] Ælian, *V. H.*, 12, 1.

[7] Wescher, *op. cit.*, No. 16. Besides the various dictionaries of antiquities, Becker, *Charicles*, etc., the reader may consult Mahaffy, *Social Life in Greece;* Welcker, *Kleine Schriften*, vol. iii., and Hermann, *Lehrbuch der Griechischen Antiquitaten*, 1882, vol. iv.

XVI.—EARLY ROMAN MEDICINE.

"ROME," says Pliny, "was for six centuries without physicians, but not without physic," and in his *Natural History* gives us a copious account of the mixture of simples and composition of which this physic was composed.

But Pliny is a prejudiced witness; his ideal is the ancient Roman of the good old days, whose small farm supplied him with food and with all the medicines which his hardy frame required, and his object is to show that empire, luxury, and physicians all came in about the same time. Yet even by his own account, the first Greek practitioner came to Rome in the year of the city 535, and other writers mention "medici" at a much earlier date.

The native Roman medicine may be briefly dismissed. King Numa is said to have declared that all diseases come from the gods, and are to be averted by prayer and sacrifice. The number of medical divinities was very great, for besides Apollo and Minerva, temples were dedicated to Febris, Mephitis, and even, it is said, a Dea Scabies, while the young mother might appeal to no less than fourteen goddesses, from Juno Lucina down to Prosa and Portvorta.

In later times this primitive medicine was modified in two directions by the magic of Etruria and by the more rational practice of the Greek colonies in South Italy, and indications of both these influences are seen in the works of Pliny's favourite hero, Cato the Censor, who hated all Greeks, and especially hated Greek physicians. In his book *On Agriculture* Cato gives directions for treating sick slaves and cattle, of which the latter are most important. For oxen he prescribes a remedy in which three is the ruling number—three grains of salt, three laurel leaves, three leaves of rue, etc., to be given three times a day for three days; both the animal and the giver of the drug must be fasting, and both must stand erect. Of like nature are the incantations which he recommends for cases of fracture and dislocation.

But Cato's grand panacea is cabbage, the favourite vegetable of the Pythagoreans. He gives it internally both raw and cooked; he applies it as a poultice to sores, declaring that it will even cure cancer; and he squirts its juice into sinuses and fistulæ by means of a syringe composed of a bladder tied to a reed. If a slave is ill and

cabbage will not cure him he should be got rid of, for it is bad economy to feed men who cannot work.. That this hint was not neglected is evident from a decree of the Emperor Claudius, which provides that sick slaves exposed by their masters shall be free if they recover, and that the killing of a sick slave shall be murder.[1] There is, however, one department of the healing art in which the Romans have some claim to originality, that of State medicine and hygiene. Thus the "lex regia" of King Numa ordered the performance of Cæsarian section on women who died in child-bed, while the law of the "Twelve Tables" committed the madman (*furiosus*) to the care of his nearest relatives, fixed the extreme duration of pregnancy at 300 days, and forbade the burning or burial of bodies within the city walls.

One of the most ancient remnants of Roman masonry is the great sewer, or "Cloaca maxima," ascribed by Livy to the Tarquins. Recent excavations have revealed special spots (*ustrinæ*) set apart for burning dead bodies and probably refuse also, and a pillar has been found with the inscription: "Take your rubbish farther, or you'll be fined".[2] Above all, the fourteen great aqueducts, which were at one time capable of supplying the city with more than 300,000,000 gallons of drinkable water daily, show that in some forms of sanitation ancient Rome need not have feared comparison with modern London.[3] With a few doubtful exceptions such as these, it must be remembered that the medicine now to be described is entirely Greek, and, indeed, that everything worthy of the name, from Hippocrates to Harvey, is Greek medicine, whether we find it at Alexandria, Rome, Bagdad, Salerno, or Paris.

According to Pliny, the first Greek practitioner came to Rome B.C. 219, and had the appropriate name of Archagathus (a good beginning). He was received with favour, granted the citizenship and a surgery in the Acilian cross-way, and entitled "Vulnerarius," the Wound-curer. But the people were soon disgusted "by his ferocity in cutting and burning," so they called him the Executioner (*carnifex*),

and would have no more of him. No Greek writer knows anything of Archagathus, and he was not improbably a low-class surgeon, who, having failed at home, thought he might still make his fortune among the "barbarians".

The next arrival was of very different character, Asclepiades of Prusa, probably the most successful practitioner of antiquity. Beginning as a poor man, he may have learned medicine at Alexandria, and certainly studied rhetoric at Athens, where he was possibly that Asclepiades of whom Athenæus says that he followed the philosophers in the mornings and earned his bread as a miller's labourer in the afternoons. Finally, he came to Rome, where his high culture and wonderful address gained him the friendship of Crassus and Cicero, and made him the fashionable physician of the day. But Asclepiades had other aids to success in addition to "a good bedside manner". He introduced a new theory into medicine based upon the atomic philosophy of Democritus and Epicurus, a doctrine about this time made popular in Rome by the great poem of Lucretius. He declared that the human body was composed of atoms, with intervals between them forming canals or "pores," through which still finer atoms circulated, and rejecting the humoral doctrines, he ascribed disease to changes in the relation of atoms and pores, and especially to a blocking up of the latter.

Secondly, Asclepiades abused his predecessors, a never-failing recipe for notoriety in medicine. He called the expectant treatment of Hippocrates "a meditation on death," ridiculed the "vis medicatrix," asserting that Nature did quite as much harm as good, and that the physician should not be her servant but her master, and should at once intervene in order to cure his patient "quickly, safely, and pleasantly". He was the first to distinguish acute and chronic diseases, and paid great attention to the latter, which were naturally prominent in a large and luxurious community, and which had been somewhat neglected by the Hippocratic school.

Thirdly, Asclepiades employed modes of treatment well adapted to his patients. Rejecting emetics and violent purgatives, he relied chiefly on diet, rubbing, wine, and passive exercise, prescriptions suited to his more Epicurean clients, and upon active exercise, and cold water, including the recently invented shower-bath, which would attract those anxious to gain the ancient Roman hardihood. With such qualifications it was hardly necessary that Asclepiades should also have restored an apparently dead person to life to achieve a brilliant professional success.

His actual merit is more difficult to estimate, for his writings have perished, and his critics, as might be expected, give opposing verdicts, but on the whole the judgment is favourable. Celsus confesses himself much indebted to Asclepiades; Pliny, though indignant that "a poor man, sprung from the most volatile of nations, should give laws of health to mankind," cannot withhold his admiration. Apuleius calls him a second Hippocrates, and if Galen judges more severely, it is partly because he cannot forgive him for attacking the Father of Medicine, and for being in some sense the precursor of the hated Methodists. A modern writer has called Asclepiades "the Hippocrates of chronic disease". This is, perhaps, excessive, but if not to be compared to the Father of Physic, he may be safely called the Father of Fashionable Physicians.

The following is, perhaps, the most interesting of the few fragments which survive of the writings of Asclepiades: "That the joints of patients suffering from chronic disease may be dislocated without external violence is testified by Hippocrates in his treatise *De Articulis*. I have met with two such cases; one in a Parian who without blow or fall began to have pain in his hip, and, after he had lain in bed for three months, the head of his thigh bone was drawn and dislocated outwards, I suppose through the excess of the pains. The other case was that of a young tragic poet whose thigh bone was also dislocated outwards by the inflamed muscles drawing aside the bone, and forcing it from its place" (*Ori-*

basius, lib. xlvii). Asclepiades was also the first to mention tracheotomy, though it is doubtful whether he ever performed the operation.

NOTES.

[1] Suetonius, *Claudius*, cap. 25.

[2] Lanciani, *Ancient Rome in the Light of Modern Discoveries.*

[3] When Frontinus wrote his *De aquis Romæ* (A.D. 96), there were ten aqueducts supplying 250,000,000 gallons daily. Of this one-half went to the public baths, one-eighth to the imperial palaces, and the rest to private houses, allowing about fifty gallons per head for a population of 2,000,000. Four of these aqueducts have been restored and are found amply sufficient for the needs of the modern city. Under Diocletian there were 856 public baths, and the great bathing establishment or "thermæ," built by that emperor, alone contained 3000 rooms.

The chief "authorities" are mentioned in the text. Among modern works on the subject are Dupouy, *Médecine et Mœurs de l'ancienne Rome*, Paris, 1891; Lanciani, *op. cit.*, and *Pagan and Christian Rome*, which contains an interesting account of the vast numbers of votive offerings recently discovered near the temples of Æsculapius, Minerva Medica, and other healing deities.

XVII.—THE METHODIC SCHOOL.

ASCLEPIADES had many followers, some of whom seem to have assumed his name in the hope of thereby acquiring some of his popularity, but they would probably have soon been absorbed by one or other of the dominant schools had not one of them in his old age conceived the idea of at once simplifying medicine and discovering a middle way which should avoid the errors and combine the excellencies of the Empirics and Dogmatists. This was Themison, of Laodicea, whose fellow-citizens afterwards tried so unsuccessfully to find a middle way in religion, and who is probably referred to by Juvenal in the uncomplimentary line, "Quot Themison ægros autumno occiderit uno!"

Instead of searching for the causes of disease, like the Dogmatists, or distinguishing different disorders by their

symptoms, like the Empirics, Themison declared that the physician should observe what symptoms various diseases have in common. He would then find that in all, or nearly all cases, there was an increase or diminution of the secretions and excretions, and adapting this to the theory of Asclepiades, Themison argued that all diseases were due to a relaxation or a constriction of the "pores". These were the two fundamental "communities" of the Methodists, but a third or "mixed" was soon added, to include cases where one part of the body was relaxed and another constricted. The treatment followed at once on the principle *contraria contrariis*, and consisted of astringents or laxatives, while in mixed communities the most threatening of the two states was to be counteracted. Among astringent remedies were cold air and water, vinegar, decoctions of various herbs, especially the plantain, and the minerals, alum, lead and chalk, which were used externally. The great "laxative" was bleeding, whether by venesection, cupping, or leeches (which last the Methodists introduced into European medicine), after which came poultices, fomentations, and warmth generally. Purgatives they entirely rejected, declaring that they only substituted the opposite form of disease.

The Methodists thus agreed with the Dogmatists that the physician might reason from the seen to the unseen, *e.g.*, from the state of the secretions to that of the pores, while, like the Empirics, they taught that diseases are to be judged from their symptoms, and not from their causes, and they differed from both in the doctrine that it is unnecessary to consider the individual peculiarities of a case when once classed under one of the "communities". On the whole, they were most nearly allied to the Empirics. Like them they despised anatomy, though it might be useful to know the names of parts. They held that most diseases were general, and that in any case the locality was unimportant, for constriction and relaxation are the same wherever they occur, and require the same treatment. Nor was it necessary to know the remote causes of disease, for they always

act by producing one of the above conditions. Thus, like the Empirics, they reduced medicine to a system of treatment, and Themison's boast that he had reversed the aphorism of Hippocrates, and that life was long and the art short, was not unjustified. The stricter Methodists held that even in cases of poisoning it was not necessary to consider the poison, but only the state of constriction or relaxation produced by it, but in others common-sense was not entirely absorbed by system, and to meet such cases they invented a fourth community, the "prophylactic," just as the Empirics had escaped from a similar difficulty by means of "epilogism".

The Methodic doctrines were brought to perfection by Thessalus of Tralles, who called himself "Conqueror of Physicians," claimed to be the inventor of the whole system, and offered to teach it anybody in six months. He flourished under Nero, and dedicated one of his works to that emperor, in which he declares that he has founded a new sect, the only true one, "for no preceding physicians have left anything profitable either for the observation or cure of disease". His principal contribution to Methodism was the "metasyncritic" or alterative mode of treatment, by which he pretended that the state of the whole body, and especially of the pores, might be entirely changed. Though he claimed this, like everything else, as his own invention, he might have found it, and probably did find it, in the Hippocratic writings, whence we may take the simplest and most convenient example. In chronic disorders, says the author of the treatise, *On Internal Diseases*, it is often advantageous to try to make the patient fatter. For this purpose the amount of food should be gradually diminished and that of the exercise increased, till the patient finally eats one-tenth of the usual quantity and walks twelve miles or more daily. After maintaining this for a few days the conditions should be gradually reversed, the food increased, and the exercise diminished, till the normal state is regained. As appropriate diet for the first stage the writer recommends

roast pork and sour wine, and for the second bread, porridge, fatty substances, and sweets. Here we have the alterative treatment of the Methodists, with its "resumptive" and "recorporative" cycles in the simplest form, and Thessalus merely added complicated rules of diet and certain drugs to which he attributed special "alterative" properties. "This method," says Galen, "became a sheet-anchor for all who could not make a diagnosis, and was often successful, for many diseases are due to errors in diet."

The later Methodists, while departing considerably from the strict rules of the sect, still retained the title, and it is especially applied to Soranus of Ephesus, who flourished shortly before Galen (about A.D. 100). Many fragments of his works have survived, especially from the treatise *On Diseases of Women*, which was copied by another Methodist, Moschion, and it has been shown that the writings of Cælius Aurelianus are little more than Latin translations from Soranus. In them we find much attention paid to anatomy and diagnosis, matters despised by the orthodox Methodists, and the general rules of treatment, which always formed the strong point of the sect, are particularly well given. Thus, fresh air is said to be even more important than diet, for we are always breathing, but eat only at intervals, while charms and incantations, though they have no objective efficacy, are not to be entirely despised, for they may sustain the hopes and therefore the vitality of the patient.

We shall be able to trace a close analogy between Methodism and the Brunonian system, which flourished at the close of the last century, nor are there wanting resemblances and contrasts to a still existing "school" of medicine, and the system of Themison and Thessalus is in some respects the exact counterpart of that of Hahnemann. The term "allopathy" would indeed have puzzled Soranus, but if we take it as denoting a medical system of which the one therapeutic rule is *Contraria contrariis curentur*, it may fairly be applied to the Methodic and Brunonian doctrines, and to them only.

The Methodic system originated during a period of transition, and was rejected by the chief adherents of the older schools. Thus Celsus, who holds the balance so fairly between the Empirics and Dogmatists, has no good word for the Methodists, whom he compares to cow-doctors and savages, declaring that the old physicians knew all about the "communities," but were not content with them, and that the method of treating diseases in bulk is permissible only in large slave infirmaries, where nothing better can be got. Galen was their mortal enemy, and called them "the asses of Thessalus," though, as usual in such cases, it is hard to say which side first employed abusive language. Thessalus, like Hahnemann, appealed from the profession to the public, and, like Hahnemann, he was successful; crowds followed him, including, if we may trust a prejudiced witness, all the ne'er-do-wells in Rome. Nor are the causes of this success far to seek. Here was a theory suited by its connection with the dominant Epicurean doctrines to the philosophic Greek. Here was a rule of thumb which attracted the practical and methodic mind of the Roman. Above all, here was a short and easy system by which a self-confident individual might, with least preliminary labour, put money in his purse, label himself with an attractive name, and become a fashionable practitioner.

The fact that so many Methodists were distinguished as "ladies' doctors" may indicate that that sex was particularly attracted by the new system. Celsus tells us that it was found useful in slave infirmaries, and we may, perhaps, picture the Lady Bountiful of the period walking through such an institution, armed with the last pamphlet by Thessalus, and followed by a slave bearing the typical Methodic remedies, a bottle of leeches for all the "stricti" on one side of the ward, and a jar full of decoction of poppy-heads and honey — the famous diacodion of Themison—for all the "laxati" on the other.

NOTE.

The fullest account of Methodism is to be found in Galen's works, especially the treatises, *De Optima Secta* and *De Methodo Medendi*, i., and in the writings of Cælius Aurelianus; see also Constantin Tsintsiropoulos, *La Médecine Grecque depuis Asclépiade jusqu'à Galien*, Paris, 1892.

XVIII.—CELSUS AND ANCIENT SURGERY.

AULUS CORNELIUS CELSUS, who has somewhat extravagantly been called the Cicero of physicians and the Latin Hippocrates, is the most important of Roman medical writers. But he does not seem to have been a member of the profession, and probably intended his treatises on agriculture, medicine, war and rhetoric to form a compendium of all the knowledge requisite for a wealthy citizen, who had a farm and slaves to superintend, and might hold a public office. He may himself have been in such a position, and may have acquired some practical knowledge in the "Valetudinaria" or slave infirmaries which were maintained by rich landowners, but, except that he lived in the Augustan age, we practically know nothing of him. The historical importance of his work, *De Medicina*, consists in the excellent but too brief sketch of medical history with which it commences, in its notices of more than seventy Greek physicians whose works have perished, and in the last two books which give us some idea of the progress of surgery, since the time of Hippocrates. It may, therefore, be conveniently taken as the text for a brief account of some of the more important aspects of ancient surgery, a subject which may be further simplified by connecting it with the names of the three greatest of Greek surgeons, Heliodorus, Archigenes, and Antyllus.

Celsus tells us that medicine was divided at Alexandria into three branches, one curing by diet, another by drugs, and a third by hand, which were called by the Greeks

dietetic, pharmaceutic, and chirurgic respectively. This was, no doubt, mainly a theoretical division such as Celsus follows in his own work, but he repeats elsewhere that surgery began to have its special professors at Alexandria, and we have already noticed traces of such a division in yet earlier times. In the Roman period the physician and surgeon, the *medicus clinicus* and *chirurgicus*, were clearly distinguished, and Galen, writing on operative medicine, says he would probably have known more of the subject had he stayed in Asia, but on coming to Rome he found that such matters were left to "those called surgeons," and he had followed the general example.

The golden age of Greek surgery was the close of the first century, and it is marked by the names of Heliodorus and Archigenes, both of whom are mentioned by Juvenal; Antyllus probably flourished at least a century later, for, though largely quoted by Oribasius, he is not noticed by Galen.

Heliodorus seems to have been a pure surgeon, for all the surviving fragments of his writings deal with that art. He was specially famous for his knowledge and treatment of injuries of the head, and for the operation for hernia, and was, perhaps, the first to treat stricture by internal urethrotomy; but his name may most conveniently be connected with the history of the methods used by the ancients for checking hæmorrhage. The Hippocratic writers knew nothing of ligature, and treated hæmorrhage by cold, pressure, styptics, and sometimes by the actual cautery; but so obvious a method of closing a bleeding vessel could not long remain untried, and it was probably introduced by the Alexandrine anatomists. Celsus recommends that an injured vessel should be tied in two places, and divided between them, but it is Heliodorus who gives us the first account, not only of terminal ligature, but also of the supposed modern invention of torsion. Speaking of the operation for hernia, he says: "We ligature the larger vessels, but as for the smaller ones we catch them with hooks, and twist them

many times, thus closing their mouths". Galen at a later period even tells us that the best shop at which to buy ligatures was in the Via Sacra, between the temple of Rome and the Forum.

Archigenes was equally great as physician and surgeon. He described the varieties of the pulse with even more minuteness than Galen, and suggested that the different kinds of pain might serve to indicate the organs affected; he first drew the important distinction between primary and secondary symptoms in disease, and made the earliest attempt to classify mineral waters according to their composition; but he is especially memorable in connection with the history of amputation. The early Greeks shrunk from that operation, partly, no doubt, because of the formidable hæmorrhage, but partly also from the horror with which they, like the Arabs, looked upon any form of mutilation, the effects of which might, they thought, be continued in a future life. Hippocrates does not mention amputation in its true sense, but in cases of gangrene, when a line of demarcation has been formed, and the irretrievable loss of the limb is evident to the patient as well as to the surgeon, the latter may assist nature by removing the dead part, carefully avoiding to cut into living tissue, for this may cause fatal syncope. Some slight advance was made by the Alexandrines, but Celsus still describes amputation as "the last sad remedy," lawful only in cases of gangrene, though the circular incision is now made rather through living than dead tissue, and the soft parts are drawn back as far as possible before dividing the bone. But in the hands of Archigenes the operation assumes quite a modern shape. The indications include not only gangrene, but chronic ulcers, malignant tumours, severe injury, and great deformity. In some cases the whole part to be removed should be sprinkled with cold water and bandaged, the limb being then tightly constricted with a cord above the point of amputation; where this is not practicable, the chief arteries going to the part should be cut down upon and tied. Rubber bandages

were then unknown, or Archigenes might have anticipated the "bloodless" method of Professor Von Esmarch.

The surgeons of the empire seem to have been acquainted with amputation by flaps as well as the circular method. Thus Heliodorus writes: "Amputation above the elbow or knee is very dangerous owing to the size of the vessels divided. Some operators in their foolish haste cut through all the soft parts at one stroke, but it seems to me better to first divide the flesh on the side away from the vessels, and then to saw the bone, so as to be ready at once to check the bleeding when the large vessels are cut. And before operating I am wont to tie a ligature as tightly as possible above the point of amputation." This would probably result in something like a flap operation, which is still more clearly described by Heliodorus in his directions for removing a supernumerary digit: "A circular incision is made round the digit near its base. From this two vertical incisions are made opposite one another and the flaps so formed dissected up. The base being thus laid bare, the digit is to be removed by cutting forceps, and the flaps are then brought together and sutured."

Antyllus, like Archigenes, seems to have been a general practitioner, for, besides purely surgical subjects, he wrote on hygiene, the choice of proper sites for houses, and the action of purgatives and other drugs. His name is probably better known than that of either of his predecessors, owing to its connection with the earliest operation for aneurism; this, however, is described in most works on surgery, and our brief remaining space will be better occupied by a historical sketch of the treatment of cataract. When the lens of the eye is opaque, it may be removed from the axis of vision in at least four ways, all of which seem to have been known to the Greeks: (1) It may be simply depressed or "couched". This operation, though now abandoned, is of great antiquity, having been known to the Egyptians and Hindus, and was probably the only one practised up to the Christian era. (2) It may be extracted entire, a method

first mentioned by Galen, apparently as a recent invention, for he says: "Some have taken in hand to remove cataract also". (3) The lens may be broken up and left to be absorbed. Celsus notices the division of cataract, though only as a preliminary to couching, but Galen clearly describes the operation, which he rightly confines to soft cataracts, or, as he terms it, those of more serous humor. (4) The lens may be broken up and at once removed by suction. This operation, recently introduced into modern medicine, was long practised in Persia, and, according to Albucasis, was invented there in his time (eleventh century); but Rhazes, who was himself a Persian, and who had special inducements to study the treatment of cataract, attributes the earliest mention both of extraction and suction to Antyllus, remarking: "Antyllus said, 'Some also have made an opening under the pupil, and have extracted the cataract; this can be done when the cataract is small, but if large it cannot be extracted, for the humor comes out with it. And some have used a glass instrument (*concilum vitreum*), and by sucking it have sucked out the cataract and the humor with it'" (*Continens*, ii. 3).

An account of ancient surgery would be incomplete without some notice of the interesting discoveries of surgical instruments made in recent years. The most numerous and important are those from Pompeii and Herculaneum, about 200 in number, forty of which were found in one house at Pompeii, which has therefore been called the School of Surgery, or the Surgeon's House, while five others were discovered among some cooking implements in an oil shop. They include ninety pairs of bronze forceps, the majority apparently intended for removing superfluous hair, though one has curved claws, and another spoon-like blades with dentated edges. Besides these there are forty-five probes of various shapes and sizes, thirteen bronze cupping instruments and the same number of iron bistouris; a lancet with silver blade and bronze handle; an S-shaped catheter, and, last but not least, a three-bladed uterine, and double anal

speculum. At Rheims eighteen surgical instruments were discovered, including forceps, spatulæ, scalpels, two syringes, and a little balance, of the so-called "Roman" type, all in bronze, even to the blades of the scalpels. With these was the seal of an ophthalmic surgeon, and some of his drugs which will be noticed in a future chapter.

NOTE.

I have adopted the usual theory which makes Celsus a member of the patrician "gens Cornelia," but there is no definite evidence on the subject. He may possibly have been the descendant of one of those 10,000 slaves whom Sulla enfranchised in one day, and who are called by Cicero, "Græci sacrilegi, jam pridem improbi, repente Cornelii," or even the son or grandson of Cornelius Artemidorus, physician to the infamous Verres, whom he assisted in plundering his own native town of Perga. Such expressions as "Græci vocant," "Nostri dicunt," would come readily from the descendant of a Greek freedman who was prouder of his citizenship than of his ancestors. In this case he may have been a regular physician, but it is scarcely conceivable that a genuine member of the great family of Sulla and the Scipios should have been a practitioner of what was then the homely slighted doctor's trade.

After Celsus the chief authorities on ancient surgery are Paulus and Oribasius, especially the former's sixth book, and the latter's forty-fifth, which is preserved in the "surgical collection" of Nicetas, from which the above translations are taken.

For ancient surgical instruments see *Dublin Quarterly Journal*, 1852, *Annales d'Oculistique*, 1866, and for Celsus, Finlayson, *Glasgow Med. Journ.*, May, 1892.

XIX.—GALEN.

ACCORDING to the greatest of modern historians the second century of our era was the period in which mankind most nearly realised the fabled age of gold. The civilised world rested for a brief interval secure under the beneficent shadow of the Roman peace, and was ruled with paternal despotism by three great emperors, each of whom excelled his predecessor in wisdom and virtue. But if the age of Hadrian and the Antonines brought more happiness to mankind than that

of Pericles, as periods in the history of human development they cannot for a moment be compared. Hippocrates, great as he was, might have found more than one equal among his contemporaries, but the second century can boast of but few men of genius, the most famous of whom was far inferior to Hippocrates. This was Claudius Galen (131-200), a man who not only knew all that there was to know in his age, but possessed sufficient talent and originality to acquire the position of a medical dictator, and to maintain it for more than 1000 years.

Galen was the most prolific of ancient authors; he wrote upon philosophy, mathematics, grammar, and law, as well as medicine, and his 500 treatises equalled in number, and probably exceeded in bulk, those of Aristotle. Of the 181 which survive under his name about eighty are spurious or doubtful, or exist only in fragments and in Latin translations; but the remainder contain a complete and systematic view of Greek medicine, and gave laws to the civilised world in anatomy, physiology, and the doctrine and treatment of disease for upwards of fourteen centuries. Their influence can still be traced in many departments of modern medicine, and some of the teaching of the physician of Pergamus remains a possession for ever for the healing art. The following is a very brief outline of the more practical part of this teaching :—

Galen's anatomy was based partly on that of the Alexandrines and of his immediate predecessors, Marinus and Rufus of Ephesus, but especially on his own dissections of monkeys and other animals, of which he mentions many kinds, from an elephant down to mice, birds and fishes. Among other discoveries, he first pointed out the platysma, popliteus, and interossei muscles, the ductus arteriosus, and the three coats of the arteries. He omits no opportunity of asserting the great importance of anatomical knowledge in medicine, and declares that, though he rarely operated himself, he had often saved his colleagues by timely warnings from such disasters as befell a certain surgeon who divided the muscu-

lospiral, median, and ulnar nerves, and the brachial vessels, owing to his ignorance of their position. The operator, says Galen, was so terrified that he only ligatured the vessels, and the partially-paralysed patient avenged himself by following the surgeon in the streets calling after him: "You cut my nerves".

Galen's physiology, though somewhat spoilt by excessive theorising, was no less admirable. He proved by experiment the falsity of Erasistratus' doctrine that the arteries contain air only, though at the same time he hindered the discovery of the circulation by three erroneous statements—(1) that the veins originate from the liver; (2) that the most important motion of the heart is its diastole, and (3) that the septum between the ventricles is permeable. In opposition to his predecessors, he declared that respiration serves not only to cool the body, but to maintain the animal heat, and made the happy suggestion that when we discover what part of the atmosphere supports combustion we shall also know what is the source of the bodily temperature. His comparison of sound to a wave-like movement was equally fortunate.

But Galen's chief physiological work was his investigation of the nervous system, in which he made extensive use of vivisections. He distinguished sensory, motor, and mixed nerve trunks, traced the connection between the vagus and the sympathetic, showed the importance of the recurrent nerves for the production of voice, and, above all, pointed out that the nerves have no power in themselves, but merely conduct impulses to and from the brain and spinal cord. This knowledge gained him a victory over the hated Methodists. Pausanias, a celebrated sophist, had complained of loss of sensation in the fourth and fifth fingers of his left hand, and the Methodist physicians who attended him, considering the disease to be due to "constriction," applied poultices locally, but without effect. Galen was then summoned, and at once recognised the distribution of the ulnar nerve. On inquiry he found that the sophist had been

thrown from his chariot some time before and had struck his back against a stone. He thereupon applied counter-irritants to the region of origin of the brachial plexus, and the patient recovered, to the confusion of the Methodists and the triumph of Galen, who tells the story at least three times in his extant writings.

Medicine, according to Galen, rests upon anatomy and physiology, and is the art of maintaining and restoring health. Disease is the opposite of health, and, taking the simplest of his many definitions, is "an abnormal affection of the body giving rise to a lesion of function". He further divides diseases into three classes—(1) those affecting the "similar parts," or simple tissues, muscle, nerve, ligaments, etc.; (2) those of the compound tissues, or organs, heart, lungs, etc.; (3) those affecting the body generally, and, especially, the four humours. Diseases of this last class are "dyscrasiæ," and contrast with the complete and harmonious mixture of the humours "eucrasia". But this state of ideal health rarely occurs, and the predominance of the various humours gives rise to the "temperaments," sanguine, phlegmatic, bilious, or melancholic, which, though partaking of the nature of disease, are not actually to be so called unless they produce a perversion of function.

The causes of disease are also divided by Galen into three classes—(1) procatarctic (primitive or exciting); (2) pro-egumenic (antecedent or predisposing), and (3) synectic (conjunct or proximate). Of these the first are external and include mechanical injuries, and abnormalities in what came to be called the six "non-naturals" or things not innate, *viz.*, air, food and drink, rest and exercise, sleep and waking, excretions and retentions, and affections of the mind. The other two are internal, the pro-egumenic causes being those morbid states of the body which are antecedent to disease, the synectic those which coincide with it, so that when they are present the disease is also present, and *vice versâ*. Thus, to adopt a more modern nomenclature,

the exciting cause of an attack of gout may be over-exertion or excess of some kind, the predisposing cause is a morbid state of the humours which may be inherited, and the proximate cause is the actual deposit of morbid matter in the joint. Galen defines symptoms as "morbid affections dependent and necessarily following upon diseases, as the shadow follows the substance," and he distinguishes three forms—(1) altered functions (*actiones læsæ*); (2) vitiated qualities (*qualitates vitiatæ*), and (3) the result of both of these especially morbid excretions and retentions. Signs are those symptoms which *show* either what the disease is (diagnostic or pathognomic signs), or how it will end (prognostic signs). We must admit that these definitions show considerable acumen, and in their broader outlines they correspond with those still accepted, but he so delighted in defining and classifying, and carried out those processes with such subtlety and minuteness that he defeated his own purpose, and diverted the minds of generations of disciples from the more practical part of his teaching.

Our short remaining space will be devoted to his therapeutic doctrines, which display at once the best and worst sides of the dogmatic school. As an example of the former, we may take his doctrine of the "indications," under which term he comprises "whatever enables us to draw conclusions as to treatment apart from experience". The indications formed the touchstone of distinction between the three great medical sects. The Empirics rejected them entirely, for them experience was the only rule of treatment; the Methodists reduced them to one only—the restoration of the normal state of the pores by the use of contraries; while to the Dogmatists they formed the basis of all rational treatment. The first and greatest indication is to remove the cause of the disease or to prevent its action; a second class arises from the symptoms, any of which may form ground for treatment—if against Nature, by contraries, if in accordance with Nature, by similars. Other sources of indications are—the temperament of the patient, the season

of the year and external circumstances generally, and, finally, as Galen curiously adds, the patient's dreams.

His teaching as to the action of drugs was less excellent, but unfortunately far more influential. He held that some, such as emetics, purgatives, poisons and their antidotes, act through their whole substance, and are, in a sense, specifics, a doctrine consonant with the older dogmatic theory of the specific action of purgatives, which still survives in the modern terms hydragogue and cholagogue. But most drugs act, according to Galen, through one of the elementary qualities—heat, cold, dryness, and moisture, which they possess not in an actual but a potential form, each quality being further divisible into four degrees, according to its intensity. Thus pepper and opium are (potentially) hot and cold respectively in the fourth degree. This theory, after being developed to an absurd extent by the mediæval physicians, has happily vanished, leaving us only the terms "actual" and "potential" as applied to cauteries.

It is a curious fact that the treatise *On Ancient Medicine*, in which Hippocrates mentions this doctrine and rejects it, is the only one of his genuine works on which Galen has not written a commentary, probably because he felt he could not reconcile it with his own teaching.

NOTE.

The most convenient edition of Galen is that of Kühn, 22 vols., Lips., 1821-33. The two "cases" above related may be found in the treatises *De Anat. Admin.*, iii. 9 (K., ii. 395), and *De Locis Affectis*, i. 5 (K., viii. 56). See also Gasquet, "The Practical Medicine of Galen and his Time," *Med.-Chir. Review*, 1867, ii.; Falk, *Galens Lehre vom Nervensysteme*, Leipsic, 1871.

XX.—GALEN AND HIPPOCRATES COMPARED.

WHEN Marcus Aurelius returned from his first campaign against the Germans, A.D. 175, he was doubtless welcomed

with festivities, and we may suppose that even the philosophic emperor fared more sumptuously in the palace than in the camp. At any rate, shortly after his return we find him taking, in addition to his usual morning pill of theriac, a dose of bitter aloes, the "hiera picra" of Galen. In spite of this his disorder so increased that, on the following evening, a message was sent to Galen requesting him to sleep at the palace. Hardly had he got there when a slave came in, lighted the lamps, and summoned him to the emperor's bedroom. Here he found three army surgeons feeling his pulse, who said that he was in the early stage of a feverish attack. The emperor asked Galen for his opinion, but he replied that those who had been with him during the campaign would be the best judges. "However on special command I felt his pulse, and finding it quite normal, considering his age and the time of day, I declared it was no fever but a digestive disorder, due to the food he had eaten, which must be converted into phlegm before being excreted. Then the emperor repeated three times, 'That's the very thing,' and asked what was to be done. I answered that I usually gave a glass of wine, with pepper sprinkled on it, 'but for you kings we only use the safest remedies and it will suffice to apply wool soaked in hot nard ointment locally'. The emperor ordered the wool, wine, etc., to be brought, and I left the room. His feet were warmed by rubbing with hot hands, and after drinking the peppered wine, he said to Pitholaus (his son's tutor), 'We have only one doctor and that an honest one,' and went on to describe me as the first of physicians, and the only philosopher, for he had tried many before who were not only lovers of money, but also contentious, ambitious, envious and malignant."

The above (which is slightly abridged from the *De Prenotione ad Posthumum*, cap. xi.) is interesting both in itself and as affording an example of Galen's idea of a clinical history. Though he has written commentaries on each of the forty-two cases so well described by Hippocrates, it seems to have never occurred to him that they were worth

imitating, and their difference in this respect is one of the many contrasts between the two greatest of ancient physicians. Hippocrates tells us briefly and simply what he has observed of the natural history of various diseases, in order that others may do likewise, and that some definite knowledge may be obtained of what disease is, how it affects the human body, and its probable course in each case. But the stories which from time to time enliven the endless discussions of Galen are introduced either to show how much cleverer he was than his colleagues, or at best to exemplify and support some particular theory.

And in this, as in other matters, the mediæval physicians followed Galen and not Hippocrates. In the medical writings of the next twelve centuries, we shall find many interesting stories of patients, but we shall not find a single clinical history of the type originated by Hippocrates, and taken down daily by every modern "clinical clerk". Why was it that our ancestors chose Galen as their guide, while the physician whom he himself acknowledges as his master, and whom all now admit to have been the grander genius, became for a time little more than the shadow of a great name?

One reason was that the system of the former was adopted by the Arabs, whose greatest representative, Avicenna, may be described as more Galenic than Galen himself, but others may be found in the diversities between the two physicians, the more important of which may be briefly enumerated. Some of them lie upon the surface. Hippocrates separated medicine from philosophy; the great aim of Galen was to reunite them. Hippocrates thinks little of theory and much of observation; Galen, if he does not absolutely reverse the order, at least considers them of equal importance. To Hippocrates medicine is before all things an art, "the Art," as he continually calls it; Galen considers this as its lowest aspect, but his object is not so much to convert it into a science as into a philosophic system, and he accepts in its fullest sense the Dogmatic motto: "The physician who is also a philosopher is godlike".

Other differences are connected with the spirit of the times in which they lived, and these had a still greater influence on the future fate of their doctrines. The age of Hippocrates was marked by the free development of individuals and of small independent communities, and to this his teaching corresponds. He inculcates, not hard and fast rules, but general principles, which the physician must adapt to each particular case according to his individual judgment, and with such modifications as circumstances may require. And as with the physician so with the patient. The latter is to be looked upon as an independent organism, capable of self-regulation and not to be rashly interfered with from without or forced to adapt itself to the laws of any arbitrary system. Galen, on the contrary, was the member of a vast political organisation, embracing the whole civilised world, which, while it retained the forms of the republic, was in reality an autocracy, and which gave a brief respite from internal broils at the cost of freedom and progress. And similarly the Galenic medicine, while retaining some of the language of Hippocrates, was an attempt, and a successful attempt, to establish a universal system, to which both the mind of the physician and the bodies of his patients were expected to conform themselves, and which though it put an end to the quarrels of the schools tended at the same time to hinder progressive development. The mediæval period resembled the age of the Antonines far more closely than that of Pericles, and was essentially an age of authority in all things, bodily, mental and spiritual. Hippocrates, or one of his immediate pupils, had said: "Science and belief (opinion) are two things, the one begets knowledge, the other ignorance". It was hardly likely that the "Ages of Faith" would adopt such a teacher, especially when Galen, like an infallible Pope, was ready with a fixed rule for every case, and with a theory, or at least an assertion, to explain every difficulty.

But though Galen is inferior to Hippocrates, and though his followers persisted in retaining his livery till it was

antiquated and outworn, thereby bringing ridicule both on themselves and their master, we must not let this blind us to the greatness and importance of his work. Some of it, as we have seen, is of permanent value. Much more of it was the best that could be done under the circumstances; and Galen seems to have collected together, as if by some special providence, those parts of the Greek medicine which could be most readily assimilated by his successors. It has been well said that just as the Roman Church preserved the spiritual unity of Western Europe during the middle ages, so did the writings of Aristotle and Galen prevent it from falling to pieces intellectually. Had Galen's works been lost, there can be little doubt that the dark age of medicine would have been darker and more prolonged than it was, for the mediæval practitioner could no more have appreciated the higher and freer teaching of the physician of Cos than he could have understood those grand words, "It seemed good to the Demos," which Hippocrates saw inscribed at the head of every decree, and heard proclaimed in every assembly.

XXI.—THE MEDICAL PROFESSION IN ROME.

In 1723 the annual Harveian oration, delivered by Dr. Richard Mead, dealt with the early history of medicine, and gave rise to a controversy on the social state of physicians in Rome which spread throughout Europe, and lasted so long that industrious Germans have devoted special works to its history.[1] But it will be sufficient for us to accept the judgment of Cicero, who says that medicine, like architecture, is no dishonourable occupation "for those to whose rank in life it is suited".[2] Had the great orator been asked whom he meant, he would probably have answered, with some surprise: "Freedmen and foreigners; certainly no Roman citizen". Recollecting his own physician, Asclepiades, he might have added that other nations had other ideas, and

that should a cultured and travelled Greek come to Rome, he (the consul) would not hesitate to meet him as an equal, though a physician, and might even invite him to the Tusculan villa to discuss Falernian wine and the Epicurean philosophy with Licinius Crassus and other consulars. But that his own son, or the son of any other respectable Roman, should study medicine, except purely as an amateur—as that intelligent young man, Cornelius Celsus, seemed to be doing—would be a calamity *quam avertant Dei immortales.* Crassus, indeed, was dead when Cicero became consul, and Celsus was probably yet unborn, but the above may be taken as expressing the ideas of even the more liberal-minded Republicans on the status of the physician.

In later times, when Julius had granted the citizenship; when Augustus had twice owed his life to his physicians; when Tiberius and Nero had well-nigh destroyed the old aristocracy of Rome, and slaves and freedmen had the ear of the emperors, the social position of medicine was greatly altered, and we find Quintilian[3] recommending as a subject for legal exercises a question which would probably have much disgusted the consul, whose eloquence saved his country: "Which is the most useful member of the State, the orator, the physician, or the philosopher?" Two other causes contributed to this rise of medicine in the social scale, the establishment of the Archiatrate, which deserves a chapter to itself, and the wealth acquired by some of its practitioners. We must not exaggerate the latter; the case was then much as it is now. A few able practitioners, a few notorious quacks, might obtain great possessions. Xenophon[4] might receive £5000 yearly from an emperor and complain that he could have got more in private practice; Charmis, the water doctor from Marseilles, might be paid £2000 by a single patient; but there was the usual crowd at the bottom of the ladder, and we hear of several physicians who were compelled to take to less honourable but more lucrative callings to escape starvation, one of whom, to the delight of the wits of the age, became an undertaker's assistant.[5] A large pro-

portion of the profession, too, still belonged to the servile class. Nor is the reason far to seek, for, by having one or more slaves educated as physicians, their owner not only saved medical expenses, but greatly increased the value of his property, and the Justinian code estimates the *servus medicus* at 60 solidi (£36), just three times the value of an ordinary labourer, and double that of an artisan.

The development of specialism, and of those various medical parasites who naturally flourish in large and luxurious communities, is perhaps the most striking characteristic of professional history under the early emperors. The skirts of the medical robe have always had an unfortunate tendency to drag in the dirt, and the general character of many of these specialists was anything but reputable. Only the more prominent classes can be here mentioned, and we shall first consider the ophthalmic surgeons and drug-sellers, leaving the lady doctors and medical rubbers for a future chapter.

In the *De Oratore* Cicero makes Crassus observe that all arts are degraded by division; and he asks ironically: "Do you suppose that in the days of the Coan Hippocrates there were special physicians for diseases, others for wounds, and others, again, for the eyes?" We have seen that there certainly were, at any rate in Egypt, and in Greece we hear both of surgeons and ophthalmists very soon after the Hippocratic age, though it was not till the Roman period that specialism became prominent. Galen tells us that, in his time, large cities, such as Rome and Alexandria, swarmed with specialists, who also travelled about from place to place. Martial enumerates some of them in an epigram: "Cascellius extracts and repairs bad teeth; you, Hyginus, cauterise ingrowing eyelashes; Fannius cures a relaxed uvula without cutting; Eros removes brand-marks from slaves; Hermes is a very Podalirius for ruptures" (x. 56). But the most numerous and notorious were the oculists, who seem to have been further divided into a medical and surgical branch. The great occupation of the former was the invention of new

forms of eye-salve, which they stamped with their names, and nearly 200 seals used for this purpose have been found scattered throughout the empire. The frequent defective spelling of these seals is only one of the many proofs of the bad education of the class. Thus Galen, writing on diseases of the eye, says he thought it useless to treat the subject scientifically, for the oculists would not understand it. In cases of corneal abscess it was their custom to seize the patient's head and shake it till the abscess burst, a treatment which, according to Galen, was often successful.

The satirists are peculiarly bitter in their attacks on this class of specialists. "Now you are a gladiator who once were an ophthalmist," writes Martial; "you did as a doctor what you do as a gladiator" (viii. 74). Another epigram is yet severer: "The blear-eyed Hylas would have paid you sixpence, O Quintus; one eye is gone, he will still pay threepence; make haste and take it, brief is your chance, when he is blind he will pay you nothing" (viii. 9). But we must not suppose that there were no good eye doctors. Demosthenes, of Marseilles, whose great work on ophthalmic surgery still existed in the middle ages, is always mentioned with respect; others held official positions in the Roman fleets and armies, and we are surprised by the curiously-sounding title, "Oculist to the British Navy". It has even been suggested that one who is, in a sense, the greatest of physicians, St. Luke the Evangelist, was a specialist of this class, and that he travelled with St. Paul for the purpose of looking after that affection of the eyes with which the great apostle is believed to have been afflicted.

Among the surgical instruments found at Rheims (see p. 95) is an oculist's seal engraved on one side thus: Marcelli (ni) dial (epidium) ad aspr (itudines), and on the other: Marcelli (ni) dial (epidium) ad clar (itudinem), *i.e.*, "The scale ointment of Marcellinus for roughnesses" (? trachoma), and "for clearing the sight". With it were some fragments of dried drugs, which yielded on analysis, organic matter 33

parts, lead oxide 23 parts, carbonate of lime 18, peroxide of iron 16, black oxide of copper 4·3, and silica 4 parts; other fragments gave a considerable percentage of zinc, and "cadmium," *i.e.*, calamine, the native carbonate of that metal, is a common ingredient of the prescriptions for eye-salves which have come down to us.

The Romans used the title "medicus," as we that of "doctor," with great liberality, and sometimes applied it to a class of persons whom the Greeks called "drug-sellers" (pharmacopolæ), who were the middlemen between the physicians and the herb-gatherers (rhizotomi). The ancient physician compounded his own prescriptions, though Pliny reproaches those of his day with being unable to do so, and having to buy them ready-made from the drug-seller; and we must remember that it was not till the Arabic period that the drug-seller developed into the apothecary, or middleman between the physician and his patient. But doubtless they often sold medicines to the public, as well as perfumes, poisons, love philtres, etc., and they certainly managed to earn a very bad reputation. We find them classed with actors, ballet girls, and other (at that time) disreputable persons. A demagogue is said to bear the same relation to a genuine politician as a drug-seller does to a doctor; and a writer seeking for a type of utter folly says it is as though a town passing over a good physician chose a drug-seller as its doctor. The chief charge against them is indicated by the fact that "medicamentarius," which in the days of Pliny meant "drug-seller," had, by the time of Theodosius, become the recognised word for "poisoner".

On the other side, we may mention the last will and testament of a drug-seller in the small town of Larinum, who bequeathes 300 pots of drugs, and about £600 in money, to his son-in-law on condition that he shall always supply the poor with medicines gratis.[6] "He must have been a Christian," say admiring commentators; but we may hope that even a pagan might rise to that height of *post-mortem* benevolence.

NOTES.

[1] Schläger, *Historia litis de medicorum apud veteros Romanos degentium conditione*, 1740.

[2] *De Officiis*, i. 42.

[3] vii. i. 38. Quintilian suggests the following case: A man, having three sons, a philosopher, an orator (*i.e.*, lawyer and politician), and a physician, divides his property into four parts and leaves the extra share to the one most useful to the State. Which should have it?

[4] Pliny, *N.H.*, xxix. 5. There can be little doubt that the *Q. Stertinius* of Pliny is identical with the *Xenophon* of Tacitus and the *C. Stertinius Xenophon* of the inscriptions, C having been changed to Q by some copyist.

[5] Diaulus, who was once a surgeon,
Now assists an undertaker,
Here at length he finds the office
To which alone his skill is suited (Martial, i. 47).

Two more of Martial's medical epigrams deserve quotation, one for the light it throws upon the clinical teaching of the period, the other for the excellence of the translation.

The former may be freely rendered thus:—

Languid I lay, and thou camest, O Symmachus, quickly to see me;
Quickly thou camest and with thee a hundred medical students:
The hundred pawed me all over with hands congealed by the north wind.
Ague before I had none, but now, by Apollo, I have it (v. 9).

The following is from the *Dublin University Magazine*, vol. xlvii.:—

Last night Andragoras was well and hearty,
The merriest guest at all our dinner party,
And dead this morning! What was his attack?
He dreamt he saw Hermocrates the quack (vi. 53).

[6] Orelli, *Inscript. Lat.*, 114.

On the general subject see Mommsen and Marquardt, *Handbuch der Römischen Alterthümer*, vii. 749, etc.; Dupouy, *Médecine et Mœurs de L'ancienne Rome*, Paris, 1891, and the various Dictionaries of Antiquity.

XXII.—OFFICIAL MEDICINE IN ANCIENT ROME.

WHEN the Emperor Claudius made a speech to the Senate requesting exemption from taxes for the Island of Cos, he of course introduced the name of Æsculapius, and he told his

hearers that his own medical attendant, Xenophon, was a direct descendant of that divine physician.[1] If the emperor did not make this up for the occasion, Xenophon is the latest known member of the great family of the Asclepiadæ; he is also, perhaps, the first of a new order, that of the Imperial Archiatri, but he seems to have gained, or at least retained this honour, by breaking the oath of his guild and assisting in the murder of his master. Physicians, alas! are too often found as abettors in the crimes of the early empire, but we must remember that many were still in the position of slaves, or, at best, freedmen. In the hands of an Agrippina or a Messalina the choice must often have been between virtue and life, and we need not greatly blame a pagan practitioner if he sometimes preferred the latter.[2] Whatever else is known of Xenophon is to his credit. We have the inscriptions of the people of Cos praising him as their public benefactor; and relating his long service with the army, in which he gained the blunt spear and the gold crown, rewards for distinguished conduct in the field; and we may hope that that one terrible crime is the only blot on the otherwise honourable life of the last Asclepiad.[3]

In the principal epigraph[4] Xenophon is entitled "archiatrus," or chief physician, to "the august divinities," a term probably meant to include Agrippina and Nero; and he was succeeded in that office by Andromachus, inventor of a famous theriae, or antidote. It used to be thought that the Archiatrate was a purely Roman institution, but the office, as well as the name, appears to be Greek, for the title is applied in inscriptions to the physicians of Eastern kings, such as Mithridates of Pontus. We may, perhaps, even trace its origin to Egypt, where the title, "chief physician," was very common, and was, as we have seen, applied to the most ancient known practitioner of medicine. But whatever be its antiquity, the name has survived, in an altered form, to our own day, for philologists tell us that the German "arzt" is derived, not from artifex but from archiater, which became corrupted to "ærsater".

At Rome the office underwent a rapid and remarkable development, and diligent historians distinguish no less than five classes of archiatri. Of these, the first may be considered a natural product of the gradual conversion of the Republican "imperator" into an Oriental monarch. The sacred person of the emperor could only be tended by physicians themselves marked off from the common herd, and at the Court of Constantinople the "archiatri palatini," or "sacri palatii," formed a distinct body, whose president had the title of count, and who themselves ranked among the "perfectissimi," and might sometimes supply even an imperial vicar or a proconsul of Africa.[5]

The following was the formula for investiture of a "count" of the archiatri under Theodoric. After a eulogy of the art of medicine, and a gentle rebuke of the jealousies and quarrellings of physicians, Theodoric (or rather his minister, Cassiodorus) proceeds: "We invest you henceforth with the countship of the archiatri, that among the masters of health (*salutis magistros*) you alone may be pre-eminent and that all who have disputes in medical matters may yield to your judgment. Become the arbiter of a noble art, and decide its conflicts which are commonly only settled by the event; by so putting an end to harmful quarrels you will, in a way, benefit the sick. It is no mean office to rule over the wise and prudent and to be reverenced by those who are themselves reverenced by others. May your visits bring health to the sick, strength to the weak, and sure hope to the despairing." Here the Prime Minister airs his medical knowledge by describing the wonderful diagnoses which the archiater will make by examining pulses, urines, etc. Then in his master's name he continues: "Dwell in our palace, enter with confidence into our chamber, privileges which others obtain only at a great cost, for they enjoy them merely as servants, *tu rerum domino studio præstantis observa* (?). You may chasten us with fasting, you may impose rules which counteract our tastes, you may prescribe for us things we abhor, in a word you may exercise over us

an authority which we could not righteously exercise over others."

The second class were a further development of those communal physicians who had so long existed in Greek cities. The privileges which the gratitude of Augustus had bestowed on the whole profession were restricted by Antoninus to five, seven, or ten physicians in each city, according to its size, who were elected by the municipality and neighbouring landowners, and who, in the reign of Constantine, had acquired the title of "archiatri populares".

At Rome the need of a public medical service seems to have been less obvious, and it was not until A.D. 378 that an archiater was appointed for each of the fourteen districts of the city by a decree of the Emperor Valentinian. These differed from the former class in being under the control, not of the local authority, but of the central government, while vacancies were filled up by the votes of the survivors, whose choice, perhaps, had to be approved by the emperor.

The fourth and fifth classes comprised the heads of those clubs or societies, "Collegia" or "Scholæ," which sprang up in great numbers during the early empire, both in the medical and in other professions, and the physicians of the "porticus xystus," or gymnasium, at Rome, and of the Vestal Virgins, who continued till the beginning of the fifth century.

The "archiatri populares" were permitted to practise privately, but their chief duties were to attend the sick poor, and to instruct pupils in their art. The imperial edicts command the greatest care to be taken in their election, which was preceded by some sort of examination, but they do not seem to have had any control over the profession generally, and, as in ancient Greece, the practice of medicine was open to any one. The institution, however, doubtless had a favourable influence on medical education. Those who intended to aspire to the Archiatrate would be specially careful as to their course of study, of which they might have to give an account; while at the same time the number of

well-qualified teachers was greatly increased, and schools of medicine arose in various localities, some of which, as at Beneventum and Avranches, lasted till the beginning of the middle ages. Finally, the acquirement of a legally recognised title, carrying with it many privileges and immunities, by large numbers of physicians tended in no small degree to raise the social status of the whole profession.

The epitaph of Valeria Verecunda,[6] which calls her "head midwife of her district," seems to indicate that the poor of Rome were supplied with special as well as general medical aid, and that the ancients had already to some extent settled the question of the registration of midwives. That class, indeed, held a relatively much higher position than at present. Pliny speaks of a "Nobilitas obstetricum"; the Justinian code estimated the obstetrix of servile rank at the same high value as the "servus medicus," and they are frequently alluded to by the general title, "medicæ," for they by no means confined themselves to obstetrics, or even to the diseases of women and children. Scribonius Largus, who wrote a book on drugs about A.D. 50, mentions a "respectable matron" who cured epilepsy at Rome with a specific consisting chiefly of animals' blood, and an African "medica" who had a wonderful remedy for colic, composed of burnt horn, snails and wine, the secret of which he bought at a great price. According to the satirists of the period, these "medicæ" were of anything but high character, and were ever ready to assist in poisonings, abortions, and all kinds of wickedness; but a fairer and not unfavourable estimate may be gathered from the writings of their colleagues of the other sex. Thus the great Heraclides of Tarentum dedicates his treatise on nose-bleeding to a certain Antiochis, some of whose prescriptions Galen himself has not disdained to copy, while at a later period Theodore Priscian addressed the gynæcological part of his work on medicine to Victoria, whom he calls "the sweet servant of my art". The Roman law directed that their assistance should be invoked for the decision of certain medico-legal questions, a custom which

LANE MEDICAL LIBRARY
STANFORD UNIVERSITY
MEDICAL CENTER
STANFORD, CALIF. 94305

was probably the origin of the now nearly extinct "jury of matrons".

In conclusion, space only permits a brief notice of the medical rubbers, "the iatroliptæ" of the Greeks, who flourished greatly at Rome, and whose reputation was even worse than that of the "medicæ" and the drug-sellers. Their depravity may be best expressed in the language of the philosopher Seneca, who declares that he would rather thrust his hand into the fire, like Mucius Scævola, than have it massaged by any one of them, male or female. Pliny the younger, however, was less fastidious, or more fortunate, for we find him requesting the Emperor Trajan to grant the citizenship not only to his physician, Marinus, but also to his private rubber, Harpocras (x. 4).

NOTES.

[1] Tacitus, *Ann.*, xii. 61 and 67.

[2] The paramours of Livia and Messalina are unworthy of notice in a medical history; but we are not without instances of an opposite kind. Thus, according to Herodian, the first act of the infamous Caracalla was to order the execution of the Court physicians because they had refused at his request to hasten the death of his father Severus.

[3] Archdeacon Farrar in his romance, *Darkness and Dawn*, holds up Xenophon to execration as a hideous example of pagan depravity contrasted with Christian virtue; "cynical," "atheistic" and "case-hardened by crime" are among his milder epithets. But we must remember that Tacitus qualifies his account of the physician's guilt by the word "creditur," and that the whole story of the poisoning of Claudius has been questioned by modern critics. Xenophon may have been as estimable a man as any Christian in Rome, and was at any rate considered a credit to his family, for his sister-in-law after recounting her husband's honours including that of "tribune of the twenty-second legion, twice in sole command!" concludes as an acme of respectability with "and brother to Stertinius Xenophon, the archiatrus".

[4] Puschmann calls it a tombstone, but according to Paton and Hicks, *Inscriptions of Cos*, No. 345, it formed the base of a statue which was set up during the reign of Claudius.

[5] Alexander Severus had seven Court physicians, only one of whom was paid, the other six receiving two or three rations (*annonæ*) each, one of which was of superior quality (*annona munda*), Lampridius in Vita.

[6] Orelli, *Inscript. Lat.*, 4232.

See Briau, *L'Assistance Médicale chez les Romains*, 1869, and *L'Archiatrie Romaine*, 1877; Salomon, "Die Römischen Archiatri," in *Rohlf's Archiv*, 1879; Mommsen and Marquardt, *Handbuch der Römischen Alterthümer*, vol. vii.

The chief laws concerning the Archiatri may be found in the *Cod. Theodos.* vi. 16, 1; xi. 18, 1; xiii. 3-12, 14, 16, 18; *Cod. Justin*, x. 9, 52; *Digest*, xxvii. 1, 16; l. 9.

XXIII.—ROMAN MILITARY MEDICINE.

WHEN the fifth cohort of the Vigiles set up a pillar in honour of the Emperor Caracalla (A.D. 212) they not only immortalised themselves, but gave us some important information on Roman military medicine, for besides the names of thirteen officers and about 1000 privates, we find those of four physicians, C. R. Hilaris, C. J. Hermes, L. F. Pollux and S. L. Ecarpus. Another pillar set up at the same time by their comrades of the second cohort has been nearly destroyed, but the list of officers still remains, and concludes with the four "medici," Cl. Thamyra, Fl. Panmene. Aur. Hegumene, and Aphrodite (?). It is interesting to note that six out of the eight names are Greek, and that in the second inscription they are put in the vocative case, as if the stonemason, being ignorant of the language, had copied them direct from the roll-call of the cohort.

But before describing the well-developed medical service revealed by these and other records, let us take a glance at the state of Roman military surgery in earlier times. The armies of the Republic were levies of citizens, and we have seen that the Roman citizen of that age considered medicine beneath his dignity. It is, therefore, not surprising to find no mention of army surgeons, but it by no means follows that the wounded were entirely uncared for. The soldiers themselves possessed some rude surgical skill, and, as in modern armies, each seems to have carried bandages, and perhaps other appliances, with him, for we are told that on one

husband and married again, but, being left a widow, publicly repented of her sin, sold all her possessions, and established a hospital for the sick in which she herself laboured. "How often did she carry the sick on her own shoulders! How often did she wash the putrid matter from wounds another could not have borne to look upon! With her own hands she prepared their food, and moistened with water the parched lips of the dying."

Perhaps the first hospital founded "by voluntary contributions" was that of Edessa, which traced its origin to St. Ephrem, the Syrian, a holy man who could declare on his death-bed that he had never spoken an idle word. To achieve this miracle he was obliged to pass much of his life as a hermit, but, about A.D. 372, hearing that the poor of Edessa were dying of starvation in the streets, he issued from his cave, and rebuked the rich Christians of the town for their heartlessness. They replied that it was not charity they lacked, but an honest man to take charge of their offerings. "What do you think of me?" asked Ephrem. "You are a man universally respected, and worthy of the fullest confidence." So the saint at once made a collection, and with the proceeds established a hospital of 300 beds in the public galleries. It soon, however, fell into neglect and had to be restored at the beginning of the next century by Bishop Rabboula, whom we shall meet again shortly.

But the grandest effort of early Christian philanthropy was the great "Ptochotrophion," or Almshouse of St. Basil, Bishop of the Cappadocian Cæsarea (370-379), though unfortunately we know nothing of its medical arrangements, except that it had special physicians, nor in how far the bishop was supported by the contributions of his flock. The humility of St. Basil has left us only the letters in which he defends his expenditure, and pleads for exemption from taxes, and his silence is but partially atoned for by the florid eloquence of St. Gregory Nazianzen. That enthusiastic orator bids his hearers go forth from the gate of Cæsarea and they will find another city, before which the

the wounded. The development of an army medical service would thus be favoured by both bad and good rulers, and the following is a brief outline of its condition under the most warlike of the latter class, the Emperor Trajan, at the close of the first century.

The Roman army of this period may be classed under three heads: (1) The garrison of the city, comprising nine pretorian and four urban cohorts, together with the seven cohorts of the Vigiles, who acted as police and firemen. Each cohort contained 1000 to 1500 men, and each appears to have been provided with four surgeons or "medici". The pretorians seem to have even had specialists, for we hear of a "medicus clinicus," or pure physician, attached to one of their cohorts. (2) Thirty legions, each consisting of ten cohorts and about 6500 men. Here we only find mention of a "medicus legionis," but from what is known of the very liberal provision for the more stay-at-home soldiers, it would be absurd to suppose that there was only one surgeon for each legion, and we may estimate their number as at least six, or perhaps ten, though they were not attached to particular cohorts. They ranked with the standard-bearer and trumpeters among the "principales" or non-commissioned officers, and, as may be seen on Trajan's column, they wore the ordinary dress and arms of the legionary. (3) The infantry and cavalry of the allies, which were divided into cohorts and alæ respectively. Their surgeons were, perhaps, of a somewhat inferior class, and are sometimes distinguished by the title "ordinarius". Thus, the Newcastle Museum contains the tombstone of Anicius Ingenuus, "medicus ordinarius" to the first Tungrian cohort, one of those employed in building and defending the Roman wall.

With the standing army came the stationary camps, with which we may probably connect the camp surgeon, "medicus castrensis," and the "valetudinarium," or military hospital. The latter is first mentioned by Hyginus in the second century, but had probably already existed for some time. He recommends that it should be placed opposite the

husband and married again, but, being left a widow, publicly repented of her sin, sold all her possessions, and established a hospital for the sick in which she herself laboured. "How often did she carry the sick on her own shoulders! How often did she wash the putrid matter from wounds another could not have borne to look upon! With her own hands she prepared their food, and moistened with water the parched lips of the dying."

Perhaps the first hospital founded "by voluntary contributions" was that of Edessa, which traced its origin to St. Ephrem, the Syrian, a holy man who could declare on his death-bed that he had never spoken an idle word. To achieve this miracle he was obliged to pass much of his life as a hermit, but, about A.D. 372, hearing that the poor of Edessa were dying of starvation in the streets, he issued from his cave, and rebuked the rich Christians of the town for their heartlessness. They replied that it was not charity they lacked, but an honest man to take charge of their offerings. "What do you think of me?" asked Ephrem. "You are a man universally respected, and worthy of the fullest confidence." So the saint at once made a collection, and with the proceeds established a hospital of 300 beds in the public galleries. It soon, however, fell into neglect and had to be restored at the beginning of the next century by Bishop Rabboula, whom we shall meet again shortly.

But the grandest effort of early Christian philanthropy was the great "Ptochotrophion," or Almshouse of St. Basil, Bishop of the Cappadocian Cæsarea (370-379), though unfortunately we know nothing of its medical arrangements, except that it had special physicians, nor in how far the bishop was supported by the contributions of his flock. The humility of St. Basil has left us only the letters in which he defends his expenditure, and pleads for exemption from taxes, and his silence is but partially atoned for by the florid eloquence of St. Gregory Nazianzen. That enthusiastic orator bids his hearers go forth from the gate of Cæsarea and they will find another city, before which the

dislike which the ancients, and especially the Romans, had of the sea, and which may have rendered it necessary to offer special inducements to candidates.

NOTE.

Simpson, *Was the Roman Army provided with Medical Officers?* Edinb., 1856, and the review of this work, *Med.-Chir. Rev.*, 1857; Briau, *Du Service de Sante Militaire chez les Romains*, 1866. Mommsen and Marquardt, *Handbuch der Römischen Alterthümer*, vol. v. The indefatigable Frohlich has collected all the references to the subject found in Latin writers at the beginning of his great work on *Military Surgery*.

XXIV.—THE INFLUENCE OF CHRISTIANITY ON MEDICINE.

IT must be admitted that the triumph of our holy religion, though by no means so responsible for the decline of medicine as is sometimes asserted, nevertheless tended to hasten, rather than to hinder that downfall; but by means of one great institution it has, in the long run, done far more to further the healing art than it ever did to injure it.

We have found traces of establishments for the sick in ancient India; the Greeks possessed public "Iatreia," which can scarcely be distinguished from rate-supported infirmaries; and Prescott tells us that the Spaniards met with "hospitals" among the Aztecs of Mexico. But there is, I believe, no certain evidence of any medical institution supported by the voluntary contributions of large numbers of people, or by private munificence, till we come to Christian days. The primitive Church, as we learn from the Acts of the Apostles, cared for its poor from the earliest time, but we find no definite notice of any special buildings for the reception of the sick till the close of the fourth century. St. Jerome, writing about A.D. 400, says, that Fabiola, a noble Roman lady and his own friend, was the first to build a hospital. He tells us that she had divorced her first

husband and married again, but, being left a widow, publicly repented of her sin, sold all her possessions, and established a hospital for the sick in which she herself laboured. "How often did she carry the sick on her own shoulders! How often did she wash the putrid matter from wounds another could not have borne to look upon! With her own hands she prepared their food, and moistened with water the parched lips of the dying."

Perhaps the first hospital founded "by voluntary contributions" was that of Edessa, which traced its origin to St. Ephrem, the Syrian, a holy man who could declare on his death-bed that he had never spoken an idle word. To achieve this miracle he was obliged to pass much of his life as a hermit, but, about A.D. 372, hearing that the poor of Edessa were dying of starvation in the streets, he issued from his cave, and rebuked the rich Christians of the town for their heartlessness. They replied that it was not charity they lacked, but an honest man to take charge of their offerings. "What do you think of me?" asked Ephrem. "You are a man universally respected, and worthy of the fullest confidence." So the saint at once made a collection, and with the proceeds established a hospital of 300 beds in the public galleries. It soon, however, fell into neglect and had to be restored at the beginning of the next century by Bishop Rabboula, whom we shall meet again shortly.

But the grandest effort of early Christian philanthropy was the great "Ptochotrophion," or Almshouse of St. Basil, Bishop of the Cappadocian Cæsarea (370-379), though unfortunately we know nothing of its medical arrangements, except that it had special physicians, nor in how far the bishop was supported by the contributions of his flock. The humility of St. Basil has left us only the letters in which he defends his expenditure, and pleads for exemption from taxes, and his silence is but partially atoned for by the florid eloquence of St. Gregory Nazianzen. That enthusiastic orator bids his hearers go forth from the gate of Cæsarea and they will find another city, before which the

seven wonders of the pagan world sink into insignificance. Here the saintly bishop had gathered together the poor, the fallen, the sick, and the afflicted from all parts of Christendom, nor did he hesitate to kiss and embrace the most loathsome of lepers, not out of ostentation, but in token that they also were his brothers in Christ. At a yet earlier period we hear of communities, both of men and women, "parabolani" and deaconesses, who sought out the sick and tended them in their own homes, and who in times of pestilence attracted even the notice of the heathen by their courage and devotion. But the "parabolani" unfortunately too often degenerated into body-guards of turbulent bishops, whom they assisted in asserting or refuting theological doctrines by the physical arguments of their swords and cudgels.

And this brings us to a less attractive side of our subject, the consideration of the unfavourable influences which the new religion had upon medicine. These acted in three principal ways; first, by helping to restore the primitive theories of disease; secondly, when Christianity had fully triumphed, by imposing restrictions on free-thought and investigation; and, thirdly, by giving rise to religious controversies so widespread and vehement that they sometimes seemed to absorb all the intellectual energies of the age. Of these the first was, at the time now treated of, much the most prominent, but it must always be remembered that the evil work had to a great extent already been accomplished by the Gnostics and Neoplatonists. Far be it, too, that we should in any way exaggerate this influence, or bring forward chance references to demons, incubi, and the like, as examples of the early faith of Christendom. Let us rather confine ourselves to the writings of one of the most cultured of the Eastern fathers, the great Bishop of Cæsarea himself.

St. Basil was of a weakly constitution, much liable to illness, and had therefore paid great attention to medicine, which he declares is the noblest of all worldly professions. He had in all probability read the famous treatise on epilepsy, in which the Hippocratic writer, 800 years before St. Basil's

day, so clearly proclaimed the natural origin of all disease, and thereby assisted in producing a revolution in medicine. Yet the bishop begins by flatly contradicting him. Not all diseases, he says, are produced by nature, or even by our own vices and bad habits; some are sent directly from God Himself as trials of our faith or punishments for some forgotten sin (1 Cor. xi. 30), and whenever we are conscious of this we should by no means go to a physician, but bear patiently the chastening of the Lord till He sees fit to remove it (Micah vii. 9). And more than this; some diseases may, by the permission of God, be caused by Satan (Job ii. 6, 7), and here also our chief object should be to emulate the patience of the patriarch. The good bishop, however, did not let his theories interfere with his provision of medical aid for the poor, and in the East the Hippocratic tradition was still strong enough to neutralise the worst effects of these doctrines. But when we come to consider the corresponding period in Western Europe, we shall find this theologic pathology still further developed and joined to a theologic therapeusis and a belief in the sole efficacy of prayer and the relics of the saints, which, had it been carried to its logical conclusion, would have made medicine not only a useless but an impious profession.

Among the more prominent forms of pagan religion the worship of the medical divinities seems to have lingered longest; nor did the opponents of Christianity hesitate to compare the cures wrought in the temples of Æsculapius and Serapis with the miracles of saints and martyrs, and even with those recorded by the evangelists. It was natural, therefore, that the Church, as soon as she obtained control of the secular arm, should proceed to attack these presumptuous rivals; but it was not until a century after the conversion of Constantine that the practice of "incubation" in heathen temples was finally suppressed by the decrees of the emperors and the violence of the Christians.

In the year 391, after numerous and bloody contests in the streets of Alexandria, a fanatical mob, headed by their

archbishop Theophilus, "the perpetual enemy of peace and virtue," took possession of the Serapeum. The temple was demolished, and a church built upon its ruins; the library was destroyed, and its learned frequenters replaced by monks, "men indeed in shape (says a disgusted philosopher), but swine in their habits". Similar scenes were enacted in other parts of the empire, and the imperial edicts condemned, with impartial severity, both heathen and heretics, but St. Jerome, commentating about A.D. 415 on Isaiah lxv. 4 (septuagint version), could still take his illustrations from the temples of Æsculapius.

The Christians, too, soon began to imitate the practices they had condemned. Models of healed limbs, etc., formerly suspended in temples, were now dedicated in churches, and the dream oracles sought of old at the shrines of Æsculapius and Serapis were invoked in the convents of mediæval Italy and the churches of modern Greece. Archbishop Theophilus perhaps thought it well to provide a substitute for the form of worship he had suppressed, and had no difficulty in discovering the bones of two martyrs, John of Edessa and Cyrus of Alexandria, which he translated to a spot outside the city "much haunted by demons". Here his nephew and worthy successor, St. Cyril, built them a church, in which "incubation" was practised exactly as it had been in the pagan temples. Some of the cures wrought there have been handed down to us by an ancient writer, who declares that though "less than all publicans" he has been privileged to see and share in the marvels he describes. The following is a typical example. A certain Theodore of Alexandria, having taken poison in his food, was afflicted by grievous pains, for which the physicians could do nothing. So he went and slept in the church of SS. Cyrus and John, who appeared to him in a dream, and told him to eat an asp. The startled Theodore awoke and crossed himself, for he thought that, because of his sins, devils had been permitted to personate the holy martyrs, and though the dream was twice repeated he still hesitated to obey. Then the saints,

in pity for his want of faith, bade him go at daybreak and eat what he would find by a well outside the church. He found there what seemed like a melon, and had nearly finished eating it when he discovered that he held in his hand not the remains of a melon but the tail of an asp. This gave him such a shock that he vomited not only the rest of the asp which he had eaten, but also the poison taken some time before; and the historian concludes: "Thus the saints cured, not contraries by contraries, as do mortal doctors, but likes by the use of likes". The martyrs Cyrus and John are evidently well suited to become patron saints of homœopathy. And just as the invocation of Cyrus and John was substituted for the worship of Serapis, so the place of Æsculapius was taken by two yet more famous medical saints, Cosmas and Damian, in some of whose churches "incubation" was practised, and whose healing miracles were in no way inferior to those of their colleagues at Alexandria.

NOTE.

Jerome, *Ep.*, 84; Basil, *Ep.*, 84, 94, 189, and *Interrogatio*, 55, *An Medicinæ Usus Pietatis Instituto Conveniat?* Gregory, *Orat.*, 43; Sozomen, *H. E.*, 3, 16 (for St. Ephrem); Eunapius, *Life of Ædesius;* Bolland, *Acta Sanctorum*, 31st Jan. (Cyrus and John) and 27th Sept. (Cosmas and Damian). See also Haeser, *Geschichte Christlicher Krankenpflege und Pflegerschaften;* Chastel, *Etudes Historiques sur L'Influence de la Charité durant les Premiers Siècles Chrétiens;* Burdett, *Hospitals and Asylums of the World, etc.*

XXV.—NESTORIAN MEDICAL SCHOOLS.

THE great importance of the Nestorians in the history of medicine must excuse a short incursion into the domain of theology. In the year 429 Nestorius, then recently appointed to the see of Constantinople, preached a series of sermons in which he declared that the title "Mother of God" could not rightly be applied to the Blessed Virgin. We need not repeat his arguments; the whole tendency of the age was

against him; he was accused, despite his protests, of separating the natures of Christ, and in 431 the Council of Ephesus pronounced the anathema of the Church against the archbishop and all his followers. But the heresy still flourished in Syria and the East, and the Nestorians, debarred from attaining eminence in Church or State, devoted themselves, like the Jews at a somewhat later date, especially to medicine.

At Edessa there already existed a famous school, where lectures were given in Syriac, Greek, and Persian. There were also two large hospitals, one tracing its origin to St. Ephrem, the other exclusively for women, built at the beginning of the century by Bishop Rabboula, who pulled down four pagan temples for the purpose. All these institutions came into the hands by the heretics, and they established at Edessa a school of medicine which rivalled, for a time, that of Alexandria. Love of life conquered even the hatred of heresy, and Nestorian practitioners were to be found at the orthodox court of Byzantium, some of whom appear to have become trusted physicians to the lords both of Rome and Persia. But this could not long continue; the orthodox soul of Bishop Cyrus was vexed by the presence of men whom he considered worse than heathens, and in 489 he prevailed on the Emperor Zeno to publish an edict, ordering the school to be closed, and the heretics to be driven from the empire. Armed with this, he not only expelled the Nestorians, but demolished their lecture halls, and from the materials built a church, which he triumphantly dedicated to Mary, the Mother of God.

The fugitives were received in Persia by the liberal-minded Shah, Kobad, whose yet greater son, Chosroes Nushirvan, soon afterwards welcomed the last of the pagan philosophers, whom the edict of Justinian had expelled from the schools of Alexandria and Athens. The doctrine which the Nestorians had resisted was one singularly repugnant, as they understood it, both to Persians and Moslem: "I will cleave the skull of the blasphemer, who says the Eternal

God has a mother!" is an exclamation attributed to a Mahometan conqueror; and this may have something to do with the remarkable favour shown to those heretics both by the Shahs and the Caliphs. Their skill in medicine, and their hostility to the orthodox Christians of the empire, would doubtless still further recommend them to the favour of their new rulers.

When the exiles arrived in Persia they found at Gondisapor a kind of school or university, but whether in the hands of Zoroastrians, or of descendants of the Persian Christians said to have been converted by St. Thomas the Apostle, we do not know. It may, indeed, have been of Greek origin, for, though the Arabic story that physicians sent by Aurelian to attend his sister, the wife of Sapor, settled there, is unfounded, the town was originally peopled by captives from the cities and armies of the empire. In any case it rapidly became Nestorian, though the heretics, with remarkable toleration, allowed the pagan philosophers to take part in the teaching. As at Edessa, the medical faculty seems to have predominated, and there are even traces of clinical instruction, for we find the students of theology forbidden to "follow" the physicians, while those of medicine are urged not to omit the daily reading of religious books. Another chronicler is yet more explicit. All the Christian students, he says, began their day's work by reading the Psalms and Gospels, then the theologians betook themselves to the study of the commentators, while the medicals went to the hospital. The same applies to other Nestorian schools at Seleucia and elsewhere, in each of which medicine seems to have been studied, and a Catholic historian remarks with astonishment that the physicians and jurists had an equal vote with the bishops and presbyters in the election of the patriarch.

Meanwhile Nestorian Christianity spread rapidly in Persia, and its missionaries penetrated to the confines of China and the heart of India. It may have been information thus obtained which induced Nushirvan to send his own

physician, Burzweih, to India, to examine into and report upon the state of medicine in that country. He brought back, not only medical works—probably those of Susruta and Charaka—but things yet more valuable, the game of chess, and the Hitopadesa, a collection of Hindu tales, said to lie at the base of the *Arabian Nights* and of half the romances of mediæval Europe. At a later period we even find Hindu physicians among the professors at Gondisapor.

Thus were gathered together in one spot the ancient knowledge of the East, the remains of Greek free-thought, and the most liberal-minded of the Christians, awaiting only the impulse of some fresher and more vigorous activity to take a new step forward in science. But the physicians and philosophers of Gondisapor would indeed have been astonished had they been told that this impulse was destined to come from the wandering hordes of the Arabian desert.

NOTE.

Gondisapor (Saporsburg) was the Persian name of the Persian town. It became in the softer language of the Arabs Jondisabur, and, through the ingenuity of modern orthographers, Djschondischahpour, etc.

A full discussion of the various accounts of the origin of the town and the school may be found in Meyer, *Geschichte der Botanik*, vol. iii. See also Assemani, *Bibliotheca Orientalis*, vol. iii. pt. ii., and Duval, *Histoire Politique, Religieuse, et Littéraire, d'Edesse*, Paris, 1892.

XXVI.—THE ECLECTICS AND COMPILERS.

ECLECTICISM is a term attractive to the cultured mind, for it implies the essence of culture, the choice of what is best from whatever source it comes. But if the sanguine student of medical history, hearing of the rise of a school of eclectic practitioners, should fancy he has at last arrived at a golden age, when sects and systems vanished, and great and liberal-minded physicians carried the healing arts to heights of

excellence unknown before, he would be grievously disappointed. Whatever eclectics may have done for other departments of knowledge, they did little for the progress of medicine. The title has, indeed, been applied to the greatest physicians, Hippocrates, Heraclides, Galen, Soranus, and to our own modern medicine; and, in some sense, it may be claimed by all who are not absolutely blinded by the fanaticism of their sect or system; but the medical eclectics, strictly so called, formed a distinct school which had many sub-divisions. Some, like our old acquaintance Archigenes, formed systems of their own, and these were the best, they had at least enthusiasm; but the liberal-mindedness of others was the result of that baser scepticism which despairs of progress, and has no wish to overcome itself, or of the ignorance which seeks a cheap reputation for knowledge by pretending to have weighed everything and found it wanting. Between these extremes the eclectic school comprised many able and excellent physicians, though most of them show an unfortunate tendency either to dilettantism or compilation. First, both in age and rank, is Aretæus of Cappadocia (A.D. 50-130 (?)), a scholarly physician who lived apart from the controversies of his time, and composed in the old Ionic dialect word pictures of disease, the truth and vigour of which are universally recognised. But his writings, excellent as they are, had little influence on medical history, and as they are readily accessible to English readers, need not be further considered here. What the physicians of that age required was, not a reversion to Hippocrates and Nature, but to be told on good authority what they were to think, and above all what remedies they were to employ in each separate disease; and the typical products of the post-Galenic epoch are a series of compilations, varying in size and value, but having certain tendencies in common. We first meet with large compilations, which gradually supplant the works of original writers, and sometimes cause their complete disappearance. These are replaced in their turn by shorter abstracts and epitomes, in which the therapeutic part is enlarged at the expense of

the other divisions of medical science, till we finally get to works containing merely the names of diseases, followed by long lists of drugs which will more or less certainly cure them. At the revival of science we shall be able to trace a process exactly the reverse of this, and shall find the mediæval receipt-books gradually replaced by the short compendia of the Salernitan masters, which themselves disappear before the great Arabic compilations, the *Continens* of Rhazes, and the *Canon* of Avicenna, till at last we arrive once more at original writings. At the same time, the study of the nature, diagnosis and causes of disease re-assumes its proper position, and in our modern medical handbooks we can point triumphantly to pages of pathology followed by a paragraph on treatment, a proportion which, curious as it may seem, is as much the sign of a progressive as the reverse is the mark of a decadent age in medicine.

The first and greatest of the compilers was Oribasius of Pergamus, physician and friend of the Emperor Julian (360-363), at whose suggestion he composed the seventy books of his *Medical Collections*. Only about a third of this work survives, but it is of great historical value, for Oribasius invariably mentions his authorities, and quotes them with exactness, and it is to him that we owe most of our knowledge of such practitioners as Antyllus and Archigenes.

Oribasius is the last of the great pagan physicians, but the first important Christian writer on medicine lived nearly two centuries later. This was Aëtius of Amida, who held the title of Count (*comes obsequii*) at the Byzantine Court, probably under Justinian I. (527-565), and composed the second great medical compilation, the *Tetra-biblos*, in sixteen books. Amida on the Tigris was one of the most easterly outposts of Greek civilisation, and it is interesting to notice that Aëtius makes the earliest mention of such eastern drugs as cloves and camphor, which were afterwards more fully introduced into medicine by the Arabs. His work is especially distinguished by its long lists of com-

plicated prescriptions, and the passages which indicate his religion are of a somewhat ominous character. Thus, if a patient has a bone in his throat, it may be extracted by forceps, or he may be given a piece of raw meat on a string, to be pulled up when he has swallowed it, or thus: "Bid the patient attend to you, and say: 'Bone (or whatever it is), come forth, like as Christ brought Lazarus from the tomb and Jonah from the whale'. Then take him by the throat, and say: 'Blasius, martyr and servant of Christ, saith, Either come up or go down'" (ii. 4, 50). Elsewhere, in describing an ointment, he declares that it is necessary to repeat continually during its preparation: "The God of Abraham, Isaac, and Jacob give efficacy to this salve".

About a century after Aëtius, a third medical epitome was compiled, in seven books, by Paul of Ægina, the last important product of the great school of Alexandria. Aëtius and Paul resemble one another in many respects; both are largely indebted to Galen and Oribasius; both seem to have added some original matter, but as neither hesitates to quote his predecessors, even verbally, without mentioning their names, it is impossible to decide how far this originality is genuine. While Aëtius devotes himself chiefly to medicine, the most brilliant part of Paul's epitome is the sixth, or surgical book, which was much valued by the Arabs, who estimated still more highly his work on diseases of women (now lost), and gave him the honourable title of the "Obstetrician".

Among the writers whom Paul frequently quotes, but rarely mentions, is Alexander of Tralles, a younger contemporary of Aëtius, an eclectic of the highest type, who may be considered the last of the great Greek physicians, as his brother Anthemius, builder of the church of St. Sophia, is the last of the great Greek architects. His pathology, indeed, is taken entirely from Galen, whom he never mentions without the epithet "most divine," but in questions of treatment he often contradicts his master's directions when opposed to his own experience. While adopting many of

the excellent general rules of the Methodists, he insists, in truly Hippocratic language, on the necessity of considering the individual patient, and on the folly of treating diseases by a rule of thumb; and though his works show the usual tendency to long lists of prescriptions, including some of a very curious nature, he never omits to assert that careful diagnosis should precede treatment, and to point out the importance of discovering and attacking the cause of the disorder.

But he is as eclectic in his superstition as in his science, and introduces numerous charms taken indiscriminately from Homer, Orpheus, the Persian Magi, and the Christian Scriptures, as well as still more absurd prescriptions in use among the vulgar. The following is "an amulet for quartan ague which I have proved by many experiments. Take a live dung beetle, put him in a red rag and hang him round the patient's neck" (xii. 8). A green lizard together with the patient's nail parings may be used instead of the beetle. "For epilepsy take a nail of a wrecked ship, make it into a bracelet and set therein the bone of a stag's heart taken from its body whilst alive; put it on the left arm; you will be astonished at the result" (i. 15). Alexander, indeed, apologises for these absurdities by saying that patients are like besieged cities and must be relieved by all possible means, that they undoubtedly do recover after using them, and that the most divine Galen, though he despised charms and amulets in his youth afterwards recognised their value (ix. 4).

Contemporary with Paul of Ægina was Theophilus, physician to the Emperor Heraclius (603-41), who bore the honorary title of Protospatharius, or Captain of the Guard, and wrote several short works, on anatomy, fevers, pulses, and urines, condensing with considerable skill the Galenic doctrines on those subjects. The *Anatomy*, which has been edited by Dr. Greenhill (Oxon., 1842), perhaps contains some original work, *e.g.*, the description of the palmaris brevis muscle, and olfactory nerve, while the two last named

treatises were afterwards paraphrased in Latin verse by a distinguished member of the Salernitan school, under which heading they will be further considered.

The stream of Greek medicine, which we have followed for more than a thousand years, now divides into three branches, each of which must be traced separately. The first and most direct continuation flows in a narrow and sluggish current, whose bed is sometimes nearly choked by the rocks of theological controversy, and ends abruptly amid the ruins of the Eastern empire. The second, for a time the broadest and clearest of the three, turns eastward through fresh fields; upon its banks grow healing plants unknown before—senna, cubebs, orange, and tamarind—and in its waters—if we may continue the metaphor—swim strange fish, the chemist and the apothecary, till finally bending to the west, it empties itself almost entirely into another stream. This third or Western branch, rising in the marshes of ignorance, and covered by the mists of superstition, gradually grows wider and more rapid, and receiving copious affluents from the other two, finally develops into a mighty river flowing "with pomp of waters unwithstood," and bearing in its bosom, let us hope, the healing of the nations.

NOTE.

The eclectics, with the exception of Aëtius, have been fortunate in their editors; *Aretæus* by Wigan, Oxon., 1723, and Adams (Greek and English), Sydenham Society, 1856; *Oribasius* by Bussemaker and Daremberg, six vols., Paris, 1851-76; Adams' edition of *Paulus* (translation and notes), three vols., Sydenham Society, 1845-7, is the greatest English medico-historical work of the century. The works of Alexander of Tralles have been published in Greek and German with a valuable introduction by Puschmann, Vienna, 1878. Only about half the work of Aëtius has been printed in the original, and the above quotations are from the Latin version of Cornarius in Stephanus, *Medicæ Artis Principes*. See also Daremberg, "Paul d'Egine et les Médecins Compilateurs," in his *Médecine Histoire et Doctrines*, Paris, 1865.

XXVII.—BYZANTINE MEDICINE.

LEO III., the great Isaurian emperor, had triumphantly defended Constantinople and Christendom against the Saracens, but he failed to preserve his own mind from being affected by the doctrines of the prophet, whose stern monotheism and horror of images may have seemed a higher form of faith than some aspects of the dominant Christianity. At any rate, in 726 Leo published an edict commanding all pictures and images to be removed from the churches, and thereby inaugurated the iconoclast controversy, lasting more than a century, and ending in the triumph of the orthodox party, which was vigorously supported by monks, by women, and by the Roman pontiffs. The history of the struggle has been written by the victors, who declare that the iconoclast emperors delighted in destroying monasteries and burning libraries, sometimes including the librarians, and that they entirely suppressed all "pious education". Had the result been different, Leo and Constantine might have been handed down to us as champions of Protestantism and progress, but the student of medical history need only remember that the controversy tended to complete the separation of East and West, that many Greeks fled to Italy, some of whom settled at Salerno, and that either from the absence of "pious education," or from some other cause, the history of Byzantine medicine during the whole period is a complete blank.

The Byzantines throughout their entire history appear to have devoted what intellectual energy they possessed mainly to theological controversy. "This city," says St. Gregory of Nyssa, "is full of slaves and mechanics, who are all of them profound theologians. If you want change for a piece of silver, you are informed wherein the Son differs from the Father; if you ask the price of a loaf, you are told in reply that the Son is inferior to the Father; and if you inquire whether the bath is ready, the answer is that the Son was made out of nothing." In the scanty medical writings of the earlier period there is a characteristic

tendency to ascribe the origin of medicines to biblical characters and saints, from Ezra, the priest, down to St. Gregory, the theologian. Here, for instance, is a medical salt invented by the evangelist St. Luke, "which should be used by all pious persons, for it preserves sight, prevents loss of hair, removes phlegm from the chest, favours digestion, fastens loose teeth, etc. Take Cretic hyssop, pennyroyal, thyme, dodder, ginger, salt, ammoniacum, amium, white, black, and long pepper, rub them together into a powder and use like ordinary salt." Myrepsus in the thirteenth century repeats the prescription with slight variations, and declares that the Egyptian hermits consumed great quantities, and were thus enabled to study religious books up to extreme old age.

The tenth century is marked only by the compilation of Theophanes Nonus, which may be fairly characterised as the worst specimen of its class, and consists of carelessly made extracts from the works of older compilers already mentioned. It was written by command of the Emperor Constantine VII., some of whose successors made laudable efforts to encourage science and literature. Among the more noticeable is Alexius I., whose great hospital is described by his learned daughter, Anna, as one of the wonders of the world. But the filial enthusiasm of the princess prevents her giving us any very detailed information. Who shall say, she asks, how many furlongs it is in circumference? Who shall number the thousands of the sick and their attendants it contains? If a stranger visits it in the early morning, it will take him the whole day to go through the wards. The sights seen there resemble those in Solomon's porch, and the dinner hour reminds her of the feeding of the 4000 or the 5000. Manuel I., grandson of Alexius, was (if we may believe his courtiers) not only the strongest and handsomest man, but also the most skilful physician in his empire. He invented many mixtures, which were long used in the hospitals, and sometimes administered them with his own imperial hands. He could perform the

operation of venesection, and was especially proud of his skill in bandaging, so that when King Baldwin of Jerusalem fell from his horse while hunting and injured his hand, the wound was dressed by the emperor himself.

Under the patronage of these and other monarchs a partial revival of learning took place in the eleventh and twelfth centuries, marked in medical history by the names of Michael Psellus, Simeon Seth, and Nicetas the surgeon. The first was a man of universal learning, and wrote on every subject from theology to cooking. He introduced the custom of public debates or intellectual tournaments, which he perhaps borrowed from the Arabs, and which afterwards became so prominent a feature of the mediæval universities; but his purely medical works are of little importance, and comprise only a treatise on diet and on the curative virtues of precious stones.

Simeon Seth, as his name indicates, was of Eastern origin, and in his writings the Arabic remedies—manna, nutmeg, musk, cloves, camphor, distilled waters, syrups, juleps, etc. —first become prominent. But he, like Psellus, was primarily a theologian, and the greatest medical work of this period is the *Surgical Collection* made by Nicetas for the use of a Byzantine hospital, and consisting mainly of extracts from the writings of the great operators of the first and third centuries. The Byzantine surgeons, however, probably rather admired than imitated the deeds of their ancestors, and any hopes of further progress were soon extinguished by political disasters.

In the year 1204 a piratical horde, calling itself the fourth crusade, took Constantinople, and the soldiers of the cross having satisfied their fiercer passions, amused themselves by destroying those relics of Greek art and literature which had escaped the flames. For sixty years peace reigned in the Byzantine lecture halls, the peace of desolation, and the first medical work published after the restoration was a sign of relapse rather than of progress. This was the *Dispensarium* or *Dynameron* of Nicholas Myrepsus, a collection of

LANE MEDICAL LIBRARY
STANFORD UNIVERSITY
MEDICAL CENTER
STANFORD, CALIF. 94305

nearly 3000 recipes from every source, Greek, Arabic, and Salernitan. It includes many universal medicines—panaceas or catholica—as well as prescriptions ascribed to the apostles St. Peter and St. Paul, and the ointment with which St. Mary anointed the feet of Christ, which had since that time been endowed with marvellous curative properties. But perhaps the most interesting is the antidote called Desmoterion, or "the prison," "for we give criminals deadly poison, and then this medicine, and they suffer no hurt. It is also efficacious in removing the pain and stiffness after torture, and in many diseases."

Before saying a final farewell to Greek medicine in its narrower sense, it is pleasant to meet with two physicians, Demetrius Pepagomenus and John Actuarius, whose works are not unworthy of a better age. The former wrote a monograph on gout, and made a praiseworthy attempt to investigate the nature of that disease, which he declares should be treated by diet rather than by drugs, wisely adding that it is easy to give directions on this matter, but hard to carry them out. During the attack, emetics and purgatives should be given, *e.g.*, aloes one part, hermodactylus (colchicum ?) half a part, cinnamon sufficient to correct the hermodactylus, scammony one sixth part, a little to be taken occasionally. Locally strychnos (belladonna ?), purslain, endive, houseleek, henbane and poppy leaves may be applied with a bread poultice, or cold water. "I have found leaves of verbascum (mullein) rubbed up in an earthen vessel, and then applied in a rag, as hot as the patient can bear it, very effective; also a fomentation of oil of roses two parts, white vinegar one part. If the pain is so great that he cannot endure this, use the following ointment: Wax one oz., saffron one-sixth oz., opium two-thirds oz., oil of roses a sufficiency. Macerate the saffron and opium in milk, and then rub them up to an ointment with the wax and oil." This last prescription is also given by Aëtius, who attributes it to Asclepiades.

Actuarius wrote many medical works, the most important

being the *De Methodo Medendi*, in which he advises that the old drastic purgatives euphorbium, scammony, colocynth, etc., which had been largely replaced by the milder laxatives of the Arabs, should be applied in ointments to the soles of the feet or round the umbilicus, a plan which he had himself employed with great success. Still more interesting is the treatise on the relations of mind and body addressed to his tutor, Rakendytes. That philosopher had asked among other things whether it is better for one's intellect to eat once or twice a day. John replies by advising him to take two-thirds of his food at noon, and one-third in the evening, "but if you are unwilling to spend time in doing the same thing twice, or are in the habit of eating only once daily," he may continue to do so, for it will make the mind, if not stronger, at least clearer. While in many respects superior to his predecessors, Actuarius has the same faith in complicated prescriptions, and gives one called "Hygia," whose virtues surpass those of all other panaceas, "for if a man takes a portion of it the size of a bean daily it will not only preserve him from all disease, but also defend him against demons, ghosts, and witchcraft". Like most of the universal medicines it contained opium, but the other ingredients are too numerous to be given here.

Actuarius also wrote the best of the numerous mediæval treatises on uroscopy, in which he describes a form of "black water" (hæmoglobinuria?) due to exposure to cold.

NOTE.

The quotation from St. Gregory is given by Jortin, *Ecclesiastical History*, iv. 71. The substance of the rest of the chapter may be found in Ideler, *Physici et Medici Græci Minores*, Anna Comnena, *Alexias*, xv. 7 (the text speaks of the feeding of the 5000 or the 7000, but I have ventured to correct the princess), Demetrius Pepagomenus, *Liber de Podagra*, Arnheim, 1753; Actuarius, *Opera Omnia*, Paris, 1556. The work of Myrepsus has been printed in Latin translation only by Stephanus, *Medicæ Artis Principes*. The questions discussed by Psellus in his cyclopædia, *De Omnifaria Doctrinâ*, probably formed favourite subjects of debate in the Byzantine academies. Here are some examples. Are

there more angels or men? More men, for all numbers decrease as they approach one, therefore so do created beings as they approach the One; also men marry, etc. Why does oil make the sea calm? Among other reasons because it floats on the surface forming a covering through which the waves cannot boil up. Is the universe alive? Some pagans thought so, but we Christians do not admit such a doctrine even to the tips of our ears. Is the sun hot? What causes excessive hunger (bulimia)? Why is the sea salt? Why are tears of stags sweet and those of boars salt? Why does meat become tender when hung in a fig tree?

XXVIII.—ARABIC MEDICINE. (1) THE TRANSLATORS.

In the year 632 there issued from the deserts of Arabia a people not entirely uncivilised, though classed by their more cultured neighbours as barbarians, armed with the tremendous forces of religious enthusiasm. Within a century they had annihilated one of the great existing empires, and inflicted a deadly blow upon the other; and after conquering Persia, and stripping Eastern Rome of her fairest provinces, had threatened the very existence of the younger nations of the West, till their career of conquest was checked at last by Frankish valour at the gates of Tours (732).

This display of physical vigour was followed by an intellectual activity hardly less wonderful. A Byzantine emperor was astonished to find that the right of collecting and purchasing Greek manuscripts was among the terms dictated by a victorious barbarian, and that an illustrated copy of Dioscorides was the most acceptable present he could offer to a friendly chieftain. The philosophers of Constantinople were amazed by the appearance of Moslem writers whom they styled with reluctant admiration "learned savages," while the less cultured Christians of the West soon came to look upon the wisdom of the Saracens as something more than human. It was this people who now took from the hands of unworthy successors of Galen and

Hippocrates the flickering torch of Greek medicine. They failed to restore its ancient splendour, but they, at least, prevented its extinction, and they handed it back after five centuries burning more brightly than before.

The cradle of Arabic medicine was the Nestorian school at Gondisapor, where the first distinguished Arab physician, Harets ben Kaladah, received his education. After practising with success at the Persian Court he returned to Arabia, and became medical adviser to the Prophet himself, who recommended him to his successor, the first Caliph, Abu Bekr. Harets was a Christian, a fact of great importance for the future of Arabic medicine, for even the strictest Moslem doctors confessed that the faithful might lawfully follow the example and precept of the Prophet in using the medical services of unbelievers. The first of the five centuries (750-1250) during which Arabic writers represented the highest form of civilised medicine was devoted to translation. The translators were all Christians, most of them being connected with the school at Gondisapor, but we shall here confine our attention to the distinguished Syrian families of Bachtishua (Bocht-jesu) and Mesuë, and the Christian Arab, Honain ben Isaac.

In the year 765 the Caliph al-Mansur, while engaged in founding the city of Bagdad, was seized with an attack of indigestion, and his friends urged him to send for George Bachtishua, superintendent of the hospital at Gondisapor, and the most famous physician in Persia. George came, saw, and cured the patient, and the delighted Caliph retained him at his Court for five years, till, smitten with a mortal disease, he begged to be allowed to die at home. Al-Mansur then tried to convert him to Islam, promising him the joys of paradise, but George replied that he would rather go to his ancestors, whether in heaven or hell; so he was dismissed with rich rewards and a special escort, who brought him yet living to Gondisapor. His son also practised with success at Court, but is less important than his grandson, Gabriel, for more than twenty years physician

to the great Harun al-Rashid and succeeding Caliphs, who, after many changes of fortune, could estimate in his old age that the total value of the fees and presents he had received exceeded £2,000,000. His son, Bachtishua ben Gabriel, was perhaps the most famous of the family, and Oriental historians have much to tell of his favour with the Caliph, Motawakkel (847-861), of the wonderful ebony chariot in which he drove through the streets of Bagdad, of his luxury and liberality, and of his terrible downfall. Once, while seated with the Caliph on his throne, the latter observed a hole in the physician's dress and proceeded to enlarge it as far as the girdle. While thus employed, he asked: "How do you doctors know when a man is mad enough to be put under restraint?" "When he has torn our dresses as far as the girdle," was the reply. Then Motawakkel laughed till he fell on his back, and, on recovering, ordered the physician to be clad in a robe of honour.

For some time Bocht-jesu lived in a manner worthy of his name (Bocht = servant), but at last, led astray by Moslem associates, he fell into sin, and married two of his slave girls on the same day. From that time nothing went well with him. He spent his nights in orgies of wickedness, and his mornings in prayer, repentance, and reading the Gospel; he lost the favour of the Caliph, was deprived of his wealth, and banished to South Arabia, where he wandered in penury and loneliness till he died.

The family of Mesuë was closely connected with that of Bachtishua, its founder, an apothecary and dispenser at Gondisapor, having been a *protégé* of George, who, noticing that he admired a female slave belonging to David ben Serapion (another Gondisapor physician and translator), bought her for £20, or £2 10s., according to another authority, and gave her to Mesuë as his wife. He was an illiterate man, but having, after thirty years' experience of dispensing, gained an intimate acquaintance with drugs, he aspired to higher things, quarrelled with the Bachtishuas, went off to Bagdad, and set up as a physician. He was so

fortunate as to cure the Grand Vizier's favourite of an ophthalmia, and the Caliph al-Rashid being soon afterwards attacked by the same complaint, the Vizier recommended Mesuë. "*You* a physician," said Gabriel, surveying the former apothecary with contempt; but he cured the Caliph in two days, and was rewarded with a pension of £1 a week. Soon afterwards Harun's sister was taken seriously ill, the friendly Vizier again recommended the man who had been thirty years at Gondisapor, and Mesuë and Gabriel once more met in consultation. The former declared the patient would die. "He lies," said Gabriel, and the prophet of evil was cast into prison to await the event, but on the death of the princess Mesuë was released and raised to an equality with Bachtishua, and the two physicians appear to have become more harmonious, for Gabriel's daughter married Michael, son of Mesuë.

But Mesuë's most famous son was John, known to the Christians as Mesuë the Elder, who was appointed by that great patron of science, the Caliph al-Mamun, president of a college of translators, and who himself founded a sort of academy for scientific disputations. He was probably more feared than loved by his subordinates, for his manners were abrupt, and his temperament cynical. Once, when seriously ill, the Nestorian clergy came, as was their wont, to pray for him. "What are these rascals doing here?" asked Mesuë. "We are praying that God will restore you to health." "A few pills," was the answer, "will do more good than all your prayers, though they go on till the Resurrection;" and he drove them out.

The Bachtishuas and Mesuës were Syrians, and their knowledge both of Greek and Arabic was probably imperfect; their work, therefore, was soon superseded by that of the greatest of the translators, one of the greatest men of the ninth century, the Erasmus of the Arabic Renaissance, Honain ben Isaac. About the year 820 there came to Bagdad a Christian Arab from Hira, who requested John Mesuë to receive him as pupil. But the people of Hira were notorious

for stupidity, so, after a short trial, John rejected him, and advised him to adopt an occupation requiring less intelligence. Honain, not to be discouraged, went to Greece, where he spent two years studying the language and collecting the works of physicians and philosophers. With these he returned to Bagdad, and began to translate and comment upon the writings of Galen and Hippocrates in a way unknown before. Even the aged Gabriel attended his lectures and professed himself edified. He never received less than its weight in gold for any of his manuscripts, and his fame attracted at length the notice of the Caliph, who appointed him a member of his medical staff. But his ability and success soon produced envious rivals, who suggested that Honain knew too much Greek, that he was in the pay of the Byzantine Court, and probably would not hesitate, on favourable opportunity, to poison the Caliph's generals or the Caliph himself. To test the character of his physician Motawakkel pretended he wished to get rid of an enemy, and ordered Honain to prepare a deadly poison. On his refusal he was cast into prison, but continuing obstinate was again brought before the Caliph, who pointed to a heap of rich dresses, gold, and jewels, and to the instruments of torture. The former, he declared, were the reward of obedience, but a second refusal should be punished by an immediate and agonising death. The intrepid Honain was unmoved; two things, he said, prevented his compliance—his religion, which forbade him to injure even his enemies, and his profession, which was instituted for the salvation of mankind, and which bound him by an oath to administer no noxious drug. "Excellent reasons," said Caliph, who loaded him with presents and restored him to his former honours. But the malice of his enemies, among whom we regret to find Bachtishua ben Gabriel, was unsatisfied. While in Greece Honain seems to have taken part in the great controversy on image worship, and to have become a zealous iconoclast. His enemies now procured an image or picture of the Virgin and Child, and showed it to the Caliph, who asked whether all Christians reverenced such things. "All,

except one of your own subjects, an impious man who believes in nothing," and they named Honain. The physician was summoned. "Here," said Motawakkel, doubtless delighted at setting the "idolaters" by the ears, "here is a representation of your God and His Mother." "God forbid!" cried Honain. "He cannot be represented; that is only an image such as they put in churches and elsewhere." "Then you think nothing of it, you would not mind spitting on it?" And, in excess of iconoclastic zeal, Honain spat upon the sacred image. The Christians appear to have enjoyed considerable liberty of internal discipline; the Caliph refused to protect his physician from the consequence of his act, and Honain was excommunicated, imprisoned, and repeatedly scourged by order of the Catholicus of Bagdad. He is said to have died of the ill treatment, or by his own hand, but a more authentic account relates that he was restored to his office and died, "chief of the physicians of Bagdad," in December, 873. Honain translated most of the works of Hippocrates and Galen, the great compilations of Oribasius and Paulus, the *Timæus* of Plato, many works of Aristotle, the Geometry of Euclid, and last, but not least, the Septuagint, from Greek into Arabic. He also wrote original works, one of which, the *Introduction to Medicine*, was much read in the mediæval universities, and which the reader will find translated in appendix iv.

NOTE.

My authorities for the historical part of this and the four following chapters are: Barhebræus, *Chronicon Syriacum* (Syriac and Latin), Leipzig, 1789, and *Historia Dynastiarum* (Arabic and Latin), Oxford, 1663; Hadji Kalfa, *Lexikon Bibliographicum* (Arabic and Latin), London, 1855; Wüstenfeld, *Geschichte der Arabischen, Aerzte*, Göttingen, 1840; Reiske and Fabri, *Opuscula Medica ex Monimentis Arabum*, Halle, 1776; Von Hammer-Purgstall, *Literaturgeschichte der Araber*, Vienna, 1850, and *Geniäldesaal Moslemitischer Herrscher*, Darmstadt, 1839; Le Clerc, *Histoire de la Médecine Arabe*, Paris, 1876; Kremer, *Culturgeschichte des Orients unter den Chalifen*, Vienna, 1875.

Money values are given in English form, the gold dinar being esti-

mated at ten shillings and the silver dirhem at sixpence, which is about the average metallic value of the coins which have come down to us. The following may help to decide the more difficult question of their actual worth at the time. Homicide might be atoned for under the Caliphs by a fine of 1000 dinars, or 100 camels, or 200 cows, 2000 sheep, or 200 rich dresses. Abdallah ben Aglab, Viceroy of Africa under Al-Rashid gave his cavalry 4, and his infantry 2 dirhems a day, which was considered very good pay. Al-Mamun paid his cavalry 100 dirhems and his infantry 40 per month (Kremer).

Honain. According to Barhebræus, Mesuë lost his temper at Honain's perpetual questioning, and exclaimed: "What have you to do with medicine! People like you ought to buy rags in the street." Then Honain went out weeping, and departed into the land of the Romans, and stayed there till he had learnt Greek. Hammer gives the following account of their reconciliation, on the authority of the Caliph's astrologer. "Honain brought me one day a translation of the *Aphorisms* of Hippocrates and asked me to show it to John Mesuë without mentioning his name. When Mesuë read it he was filled with astonishment, and declared that it must have been written by inspiration of the Holy Ghost. 'Not at all,' said I, 'it is by the pupil whom you drove away some time since.' Then he begged me to reconcile him to Honain, which I did, and they lived in great harmony together so long as I stayed at Bagdad."

Barhebræus gives a somewhat different version of the image story; that in the text is from Le Clerc, who attributes it to Honain himself.

XXIX.—ARABIC MEDICINE. (2) THE EASTERN CALIPHATE.

SINAN BEN TSABET (died 942), whose biography has been written by his son, Tsabet ben Sinan, forms a convenient link between the Christian and Moslem representatives of Arabic medicine. He was born a Christian, but his father, having been twice excommunicated for heresy, was perhaps imperfectly grounded in the faith, and he yielded, after some resistance, to the threats or arguments of the Caliph Kaher. His fame as a physician was so great that, on the occasion of an epidemic, the Vizier, Ali ben Issa, appointed him chief of a commission for providing medical aid in the towns and

villages round Bagdad. We still possess the letter of instruction in which that liberal-minded statesman declares that not even Jews are to be refused admission to the hospitals. Nay, the physician should also tend sick animals, always observing the order, "first believers, then infidels; first men, and then animals". But Sinan's chief claim to remembrance lies in the fact that he conducted the earliest known medical examination for a licence to practise. In the year 931 a patient died through the fault of his physician, and all the practitioners in and around Bagdad, except those attached to the palace or celebrated for their skill, were ordered to present themselves to Ben Tsabet for examination. Among the 860 who appeared was an old man, well-dressed, and of an intellectual countenance. Unwilling to question so venerable a candidate, Sinan suggested that he should favour him with a brief medical discourse. Then the old man pulled a purse of gold from his sleeve and laid it before the astonished examiner. He knew nothing, he said, of medical theories, but had long supported his family by the practice of the art, and hoped to be allowed to continue doing so. Sinan smiled, and promised him his licence on condition that he only undertook cases he perfectly understood, and never employed bleeding or purgatives, unless obviously called for. The candidate replied that such had been his invariable practice, and that he never gave other medicines than oxymel and juleps.

Among those exempted from this examination may have been a blind physician, who died full of years and honour shortly afterwards. This was Abu Bekr Mohammed ben Zechariah, called Rhazes from his birth-place, Rai, the first and most original of the great Moslem physicians (850-932). In his youth he had devoted himself to music, but wishing for some more useful occupation, embraced the profession of medicine, and practised it with a liberality to his poorer patients which, in spite of his fame, kept him in comparative poverty, and with a boldness and originality which gained him the title of "the Experimentator".

He is probably best known as the author of the oldest existing treatise on small-pox and measles, but this work is readily accessible in Dr. Greenhill's translation, and our space may be better occupied with other subjects. Rhazes is the most independent and therefore the most interesting of the Arabic writers on medicine. Here are a few cases from the third book of his *Aphorisms* which tend to justify the title above mentioned. "A young fellow who was with me at Jerusalem complained of palpitation, melancholy, and causeless fears. After trying many things, I told him to eat hawk's flesh flavoured with marjoram and cloves, to drink white wine instead of water, and to inhale aromatic odours. Thereby he acquired fortitude and audacity, and so I cured him." "A man travelling on a hot day fell into an acute fever; his face was red, his breath hot like fire, and his heart beat violently. I waited an hour or two expecting to see some flow of blood, but nothing happened; so I ordered his nose to be rubbed vigorously. Still there was no bleeding, and the fever and pain increased. Then I gave him ten pounds of cold water to drink, and this was soon followed by copious diuresis and decrease of the fever. But his servant, who got no water because all were busy with his master, died before evening." These, and other cases given by Rhazes and Avenzoar, form the nearest approach to clinical histories to be found from the time of Galen to the "consilia" of the fourteenth century.

Rhazes' greatest work is the *Hawi* or *Continens*, which exceeds in bulk the *Canon* of Avicenna, and is written in the typical Arab style, each section beginning with a long list of authorities, "A said," "B said," "C found," etc., and sometimes ending with a modest "I say," or "I have found".

The following are quotations from this work, which in 1395 formed the most valuable of the nine volumes composing the whole library of the medical faculty of Paris. "Ben Mesuë said: 'Let persons troubled with asthma or shortness of breath take two drachms of dried and powdered fox lung

with decoction of figs in their drink'. Galen (*De med. simpl.*) said that many cure asthma with owl's blood given in the drink, or by giving owl's flesh with the food in *spidebeg* (?), and taking its blood afterwards in wine. I say that owl's blood is not to be given in any case of asthma, for I have seen it administered, and it was useless" (viii. 1). "Hiccough. —Tabri, from Hindu books, recommends ginger boiled in water; or goat's milk taken hot and cold alternately. Saracus (Charaka ?) said: 'Sprinkle the patient with cold water so as to frighten him, or tell him some very sad or very joyful news to distract his attention'" (xi. 2). "Honain said that opium has the property of causing blood to thicken and coagulate; I say, therefore, that it is useful in all forms of internal hæmorrhage" (ix. 1).

Shorter and better arranged is the *Liber Almansoris*, dedicated to Al-Mansur, Viceroy of Chorasan, which contains ten books: (1) on "Anatomy," (2) on "Temperaments and Physiognomy," with a chapter on slave-buying. (Cap. xx. is short enough to quote entire, "On the Significance of the Ears. A man with large ears is stupid, but long lived.") (3) On "Diet and Drugs," (4) "Hygiene," (5) "Cosmetics," (6) "Medicine for Travellers," (7) "Surgical," (8) "Bites of Venomous Beasts," (9) on "Diseases and their Treatment, taken in order from top to toe"—this is the famous "Nonus Almansoris," the most popular medical compendium of the later middle ages, (10) "Fevers".

Here is chapter xxxii., "On Noises in the Ears," from the "Nonus Almansoris". "Sometimes the disorder is due to excessive acuteness of hearing, and it is considered the best evidence of this if the noises increase when the patient fasts, and decrease after a full meal. Such cases, if slight, require no treatment. If they get worse dissolve two grains of opium in oil of roses, and drop it in the ear; this, by dulling the sense, is an excellent remedy. But if the affection is accompanied by heaviness in the head and decrease of hearing, take oil of radish, oil of bitter almonds and oil of roses, with castoreum rubbed up therein, and drop in the ear.

Also expose the ear from time to time to steam of hot water containing marjoram, lavender, absinth, mint and origanum. Give the patient purgative draughts, forbid wine, and reduce his diet." Rhazes "experimentated" on animals as well as on his patients. In book viii. cap. xlii. he says that the poisonous nature of mercury has probably been exaggerated. "I do not suppose that any great harm would happen to a man who should drink metallic mercury except severe pains in the stomach and intestines. I gave some to an ape which I had, nor did I see any evil befall him beyond that above mentioned, which I concluded from the fact that he twisted about, and kept biting at his stomach, and pawing it with his hands."

To Rhazes belongs the honour of introducing the more extensive use of chemical remedies, such as mercurial ointments; of first clearly describing spina ventosa, as well as the two diseases already mentioned; and of many novel suggestions as to treatment, of which perhaps the most extraordinary is the recommendation of the game of chess as a cure for melancholia.

Contemporary with Rhazes there lived in Egypt a physician notable both on his own account, and as the representative of his nation. The Jews, whether under Arab or Christian rule, became during the ninth and following centuries very prominent in medicine, the only higher profession not entirely closed to them, and their ablest representative was Isaac ben Solomon, called Isaac Judæus or Israeli (850-950). His fame as a practitioner spread through North Africa, insomuch that the Emir Zigadet-Allah sent him £250 and an invitation to his Court. "So I came unto him (says Isaac) and saluted him humbly, abasing myself as princes love; but I found nothing serious at his Court, but only joking and laughter." There was a certain Greek there who delighted in catching Ben Solomon in logical quibbles, and obliged him once at the Emir's table to admit that "salt is sweet, and sweet salt". "But when I saw he was leading me into fallacies," continues Isaac, "I said

unto him, 'You call yourself a living being?' He admitted it. 'And the dog is a living being?' 'Yes.' 'So (I concluded) you are the dog, and the dog is you.' Then Zigadet-Allah laughed aloud, whereby I saw that he cared more for wit than for wisdom." On the fall of the Aglabite dynasty Isaac returned to Kairouan, where his wisdom was appreciated, and he became tutor and physician to several Egyptian princes. Though he lived for a century he never married, declaring that so long as his work on "Fevers" survived he needed no other offspring. The book still exists, and is considered the best Arabic treatise on the subject. Among his other writings the chief is that on "Diet," a subject which he treats at greater length than any of his predecessors, even discussing the correct heat of ovens for bread-baking. But the reader may be more interested in the Jewish physician's estimate of pork. "The flesh of pigs is most nutritious; it forms a good chyme, and by its humidity and viscosity preserves the moisture of the stomach. It is diuretic and not suited to those who eat little. It is useful for those of hot and dry temperaments, for they readily digest and thrive upon it; but for those of an opposite complexion and of weak digestion, it is noxious, generating evil humours and a viscid phlegm, which may produce gout, lumbago, sciatica, renal stone, and paralysis. The flesh of old and decrepit pigs is most unwholesome; it is hard, woody, and insipid; those who habitually eat it fall into melancholy and hectic fevers." The above works were written in Arabic, but Ben Solomon has also handed down his wisdom in *The Physician's Guide*, a Hebrew book of proverbs or aphorisms, of which the following are examples: "When a patient can be cured by diet use no drug, and when simple medicines suffice avoid complicated ones". This is also given by Rhazes, and may have been copied from him. "Treating the sick is like boring holes in pearls, and the physician must act with caution lest he destroy the jewel committed to his charge." "Make your fees as high as possible, for services which cost little are little valued."

Among the works ascribed to Isaac ben Solomon is one called *Pantegni*, or *Pantechnum*, which is practically identical with the famous *Maleki* or *Royal Book* of Haly Abbas. This resemblance can only be explained by Arabic scholars, and their authority is unfortunately divided between two hypotheses, (1) that Haly Abbas simply copied Isaac's book, substituting his own name for that of the author, and (2) that the work of the Moslem physician has been attributed by some strange mistake to his Jewish predecessor. It is hard to believe that a great work by so famous a writer as Isaac Judæus could have been republished as original a generation later without the fraud being at once discovered, and the second and more usual explanation will be here adopted.

Ali ben al-Abbas (†994), whose Persian origin is indicated by his title Al-Madjoussy, "The Magus," is the second of the great Moslem physicians, and he intended his *Royal Book* to form a complete cyclopædia of medicine, all previous works of that nature being more or less imperfect, as he points out at length in the introduction. The *Maleki* comprises twenty books, ten theoretic and ten practical, and though founded on Galen, is by no means destitute of originality. Haly gives due weight to personal experience, and urges the student to be diligent in attending hospitals, and the practice of good physicians. In contrast to Michael Mesuë, who never employed any drug which had been in use for less than two centuries, Haly Abbas insists on the importance of searching for new remedies, but he points out at the same time the necessity for caution in such experiments, and advises, among other things, that they should be first given to animals. As a specimen of the *Maleki*, we may take the twenty-fifth chapter of the fifth practical book "On the Treatment of Love," which Haly considers a form of melancholia. "Such patients should undergo a moistening regimen (black bile as we have seen corresponded to the quality 'dryness'). They should take baths, moderate horse exercise, and anoint themselves with oil of violets. They should look upon gardens, fields, meadows, and flowers,

listen to sweet and low sounds as of the lute or lyre, and their minds should be occupied by stories, or pleasant and interesting news. But they must also have some work or business, so as to keep them from idleness, and from thoughts of the loved ones; and it is good to excite them to quarrels and arguments, that their minds may be yet further distracted. Let them also cultivate the acquaintance of other young women." In the theoretical part Haly Abbas observes that both sexes are prone to melancholia at the period of adolescence. The *Royal Book* was translated into Latin in 1080 by Constantine, the African, who published it as his own composition under the name Pantegni, and in 1127 by Stephen of Antioch, from whose version the above extract is taken.

Haly Abbas, if not himself a plagiarist, is the most unfortunate of medical authors, for he has not only suffered the strange fate of being robbed by a predecessor, as well as by a successor, but he was immediately followed by another writer, who, though scarcely greater as a physician, far surpassed him in the renown of universal learning, and the *Maleki* was rapidly superseded, both among Arabs and Christians, by the *Canon* of Avicenna.

Abu Ali al-Husain ben Abdallah eben Sina is the foremost representative of Moslem science, and is rarely named by his countrymen without the honourable epithets Al-Scheik, Al-Reis, the Revered, the Prince. He has himself told us the story of his early life. Born in the province of Bokhara, A.D. 980, he could repeat the Koran by heart when ten years old. The art of healing seemed to him a comparatively easy study. "Medicine is no hard and thorny science, like mathematics and metaphysics, so I soon made great progress; I became an excellent doctor, and began to treat patients, using approved remedies. . . . At twelve years of age I disputed in law and logic." From twelve to sixteen he studied day and night, sometimes falling into a slumber and solving problems in his dreams. "When I found a difficulty, I referred to my notes and prayed to the Creator. At night,

when weak or sleepy, I strengthened myself with a glass of wine." This latter habit unfortunately grew upon him, and Barhebræus somewhat rashly asserts that Avicenna was the first philosopher addicted to strong drink. At sixteen he had mastered everything except the *Metaphysics* of Aristotle. Forty times did he read that abstruse work till he knew the words by heart, but was no nearer to their meaning. But one day being offered the commentary of Abu Nasr al-Farab at the ridiculously cheap price of three dirhems (eighteenpence), he bought it, and found there the key of the mystery. Then, having given thanks to God and alms to the poor, he started on his travels. Passing over forty years of an adventurous life, we find the great physician, worn out by excesses physical and mental, dying at Hamadan. When he saw that medicines had no more effect, he resigned himself to the inevitable, sold his goods and gave to the poor, and, betaking himself to his bed, read the Koran once through every three days, till he died in the holy month Ramadan—June, 1037.

Avicenna was not only a physician, but also an astronomer, poet, philosopher, and statesman. Of the 100 works ascribed to him only about twelve are medical, but as few besides these have been translated into European languages, it is as a physician that he is usually estimated. His chief medical book, the *Canon*, not only superseded the similar works of Rhazes and Haly Abbas, but, when translated into Latin, overshadowed for a time even the writings of Galen, and for four centuries formed the chief text-book of European medicine. Yet the *Canon* is admitted even by the Arabs themselves to be inferior in practical value and originality to the *Maleki* and the *Continens*, and its Latin translation is so dry and tedious that even the indefatigable Haller, who read the *Continens* with pleasure, admits his inability to get through the *Canon*, which he characterises as a "methodica inanitas". The reader may be content with the shortest and one of the most generally useful of its innumerable chapters. Book iii., Fen. vi., tract iii., cap. xx., "On driving

away moths: Wormwood protects clothes from moths, likewise calamint, likewise lemon-peel". But let us not, therefore, despise the work, still less its author; but rather look for the reasons for its wonderful success. Avicenna was greater as a philosopher than as a physician, and his object in the *Canon* was to reconcile the doctrines of Aristotle with those of Galen, just as St. Thomas Aquinas, two centuries later, reconciled them with those of the Catholic Church. Thus, in speaking of the causation of diseases, he discusses not only the primitive (exciting), antecedent (predisposing), and conjoint (proximate) causes of Galen, but also the material, formal, effectual, and final causes of Aristotle, a combination which could not fail to impress the mediæval physician, who held that where Galen and Aristotle differed none could decide, and that where they agreed none could dissent.

Avicenna's scientific works are, perhaps, more worthy of his fame, and the treatise *On the Uselessness of Astrology*, had it been translated, might have benefited medicine more than the *Canon*. If the work *On Petrifactions* is really by him, Avicenna may claim the title of Father of Geology, and the following extract might have been published as something new more than eight centuries later: "On the Origin of Mountains.—Mountains are produced in two ways, either by elevations of the earth's crust, as in earthquakes, or by the action of water, which has hollowed out the valleys at the same time; for there are harder and softer tracts, and wind and water remove the latter while leaving the former. Many ages (*multa tempora*) have been required to produce this, and perhaps the mountains are now getting smaller. That water has been the chief agent is shown by the marks of aquatic and other animals found on many rocks."

NOTE.

Sinan further distinguished himself by his zeal for the improvement of prisons and the care of sick criminals, and is called by Von Hammer

"the Howard of Islam". Like the Mesuës and Bachtishuas he belonged to a medical family, though his father, Tsabet ben Corra, is better known as a philosopher, and his son, Tsabet ben Sinan, as a historian. Of another son, Abul Hassan, the following story is told: When Adad-adaula, the Buide, came to Bagdad, 976, the two poles of medicine in that city were Abul Hassan ben Sinan and Abul Hassan al-Harrani. They presented themselves before him. "Who are these?" asked the Emir. "Two celebrated physicians." "I am well, and don't want them," and they left the audience chamber in confusion. But in a few minutes they again craved admission, and Ben Sinan said: "Allah prolong the Emir's life! It is the object of our art not only to cure disease, but also to maintain health, which rulers need above all men." "You are right," said Adad, and bidding them sit down he settled large salaries upon them, and was ever afterwards a liberal patron of the profession. Haly Abbas dedicated the *Royal Book* to him.

Rhazes, *Continens*, Venice, 1542; *Opera Parva*, Lyons, 1510; *On the Small-pox and Measles*, Sydenham Society, 1858. This last contains an excellent biography. Isaac Judæus, *Opera*, Lyons, 1515; the *Aphorisms* have been translated into Italian by Soave, from whom they are quoted by Haeser, i. 564. Haly Abbas, *Liber Totius Medicinæ*, Lyons, 1523; Thierfelder (in Henschel's *Janus*, vol. i.) proposes a third hypothesis, *viz.*, that the genuine *Royal Book* has disappeared, and a treatise by Isaac Judæus been substituted for it, but most authorities adopt the view taken in the text. Avicenna, *Canon Medicinæ*, Lyons, 1522. The fullest biography is that given by Von Hammer (*Literaturgeschichte*).

XXX.—ARABIC MEDICINE. (3) THE WESTERN CALIPHATE.

UNDER the prosperous rule of Abdur-rahman III., Al-Hakem II., and Al-Mansur the Regent (912-1002), Cordova, capital of the Western Caliphate, was worthy of its ancient Phœnician name, Carta-Tuba, the great city. Its 200,000 houses may have contained 1,000,000 inhabitants, whose wants, bodily, spiritual, and mental, were not unfairly provided for by 600 inns, 900 baths, 600 mosques, each with its free school attached, and including the whole province, 17 universities, and 70 public libraries. The library of Al-Hakem might have vied with that of Alexandria, for, ac-

cording to the lowest estimate, it contained 225,000 volumes, each of which had been read and annotated by the Caliph himself, if we may believe an admiring chronicler, who seems to forget that this implies a voracity of six volumes daily for a century. In an age when nobles and ladies were unable to sign their own names, there was hardly a boy or girl over twelve in the whole city and province who could not both read and write, and the adventurous Christian who penetrated to Cordova in pursuit of "Saracenic studies" rarely escaped being accused of unlawful dealings with those powers of darkness by whose aid alone the infidels could have acquired such wisdom. Michael the Scot is well known to readers of the modern Wizard of the North. Gerbert the Frank studied medicine among other things in Spain, and taught it at Rheims. We shall meet him again as Pope Sylvester II., and shall find that not even the chair of St. Peter could save one of its most learned and pious occupants from being considered, in a peculiar and terrible manner, the servant of Satan.

Such a civilisation could not fail to produce physicians and philosophers comparable to those of the East, and Rhazes, Haly Abbas, and Avicenna might have found worthy compeers in Albucasis, Avenzoar, and Averröes. The first of these, Abulkasem Khalaf ben Abbas, of Zahra, near Cordova, is sometimes placed last in order of time, but there is good reason to believe that he is the Khalaf ben Abbas who was physician to Al-Hakem II., and that Leo Africanus is, for once, correct in saying that he died A.D. 1013, at the age of 101. He wrote a great medical cyclopædia in thirty or thirty-two books, called the *Tasrif*, or *Method*, but this would only deserve mention as one of the numerous similar works superseded by the *Canon* of Avicenna were it not for the last, or surgical book, which was published separately, and which marks an epoch in medical history. It was at once the first independent work on surgery, and the first illustrated treatise on that art. The practitioners of the thirteenth century borrowed from it far

more frequently than they cared to confess, and Guy of Chauliac, the greatest of mediæval surgeons, quotes it more than 200 times. Albucasis begins by saying that Arabic surgery is in a bad way owing to the ignorance of anatomy. "I have seen a surgeon incise a scrofulous swelling in a woman's neck; he stuck his knife into the cervical artery, and the patient fell dead in his arms. I have seen another extract a large stone; he got out the stone, but brought part of the bladder with it; the patient died on the third day." "Surgical operations," he continues, "are of two kinds, those which benefit the patient, and those which usually kill him," and he intends that a description of the dangers to be feared in various procedures shall form a special feature of his work. The first of the three chapters is entirely occupied with the manifold uses of the cautery, the favourite instrument of the Arab surgeon, and the book ends as it began, with his favourite watchword, "Caution!" "Avoid perilous practices, as I have already warned you, so shall you have the more praise and profit, if God will. . . . This is the end of the book called *Al-Tasrif*, written for those who have not the entire works of Abulkasem Khalaf ben Abbas the Zahraite, on whom may God have mercy if he finishes his life in the good way."

The other books of the *Tasrif* contain much interesting matter. Thus the following reminds us of a well-known case quoted in Scott's *Demonology*: "I saw a boy, a patient of mine for epilepsy, who said that, when he was about to have a fit, a black woman seemed to come up to him dressed in the skin called 'parua,' and as soon as she reached him he fell down" (i. 2, 34). Albucasis seems to have given the first account of hæmophilia: "I found men in a certain village who told me that whenever they suffered a severe wound, it bled till they were dead, and they added that when a child rubbed his gums they began to bleed, and went on bleeding till he died. Another also having had a vein opened by a phlebotomist bled to death; and they said that, in general, most of them died thus. I have never

seen such a thing save in this village; nor do I find it noticed in ancient writers. I know not the cause of it, but as for the cure, I suppose a cautery should be applied at once; but I have never tried it, and the whole thing is marvellous to me" (xxxi. 2, 15).

Christian writers split up Abulkasem into at least three individuals, whom they called Albucasis, Alsahravius, and Benabasarem respectively, while, on the other hand, they joined several members of the great medical family of Ebn Zohr into one, whence arose the legend of a physician of that name who lived 137 years. The only one who can be here considered is Abu Merwan Abdalmalek ebn Zohr, the greatest physician of the twelfth century, and, next to Rhazes, the most original of the Arabs. His chief work, the *Theisir* or *Assistance* contains much which is not to be found in earlier writers, for, besides describing pericarditis and mediastinal abscess, Avenzoar may perhaps claim the distinction of discovering the Acarus scabiei, or itch mite. In book ii., tract. iii., cap. xix., he says: "Sometimes there arise on the body, under the external skin, little swellings which the vulgar call 'soab,' and if the skin be removed there issues from various parts a very small beast, so small that he is hardly visible". But, "through the goodness of God," there are many things which will cure this disease, and though Avenzoar does not mention sulphur, he specially recommends an application containing oil of bitter almonds.

Avenzoar, like his father, suffered many things from the bigoted Almoravide, Ali ben Jussuf (1106-43). "When Ali ben Jussuf imprisoned my father he so tormented him that he got an abscess in his left side. The physician treated it by incision, whereby he felt nothing, but it penetrated to his heart, and he died; God have mercy on his soul. I was a student at the time" (iii. 3, 36). Soon afterwards Avenzoar was imprisoned also, being brought out periodically to attend patients. "One of Ali's courtiers had long had an obscure disease, with indigestion, loss of flesh,

and occasional fever. I found him much prostrated with a slow, irregular, serrate pulse. In the epigastric region I felt a round hard mass like an apple, painful on deep pressure." So Avenzoar diagnosed cancer of the stomach (*verruca stomachi*) and saw he would die, but feared to tell him. One night the patient was suddenly taken with hæmorrhage from the bowel and Avenzoar found him collapsed, but with enough strength to suggest that the physician was not treating him properly, out of spite; upon which another courtier advised the immediate application of the torture. "I turned to him and said, 'God's will be done,' for though I had been dragged from my home and my belongings, I was not guilty in that matter; God knoweth. And when I was taken back to the dungeon I said to him that led me: 'That lord would have injured me unjustly, for I knew he must die, but feared to say so; but now let him know he will be dead in twelve days'. I was so angry and excited that I said this aloud so that he heard it. He died on the ninth day" (i. 15, 3). "Ali had a concubine who suffered from dysentery, and I laboured long to cure her, insomuch that I got tired of her, for her disease continued sixty days without change. Then she passed two large pieces of the inner membrane of the bowel, so I saw that the affection could not be due to any morbid humour, but that some one was giving her poison, and that there was no hope. And so it was, for she died of that disease according to the will of God" (ii. 1, 5). In slight gastric disorders Avenzoar has great faith in a "smaragdus" stone, probably the green jasper of Galen and Nechepsus (p. 21). "When I escaped from the hands of Ali and his men and was returning to Seville, I saw by the wayside a herb which I thought was the wood addion (?) and ate thereof; whence I got a grievous stomachache with diarrhœa. But on reaching home I placed a smaragdus over my stomach and another in my mouth and soon recovered. . . . Poisonous plants are innumerable. Wherefore it is well not to eat or even taste strange herbs unless one has a smaragdus, or theriac, or

some other antidote at hand. Now-a-days there are common people and old women (may God confound and destroy them!) who know more about poisons than do physicians; for they only study their antidotes. Nor should a doctor teach his pupils about poisons till he has made them swear never to use such drugs, according to the precept of Hippocrates; as my father made me swear when I was a boy." Then Avenzoar relates how when he began to practise and was travelling from place to place, he fell into the hands of a certain scoundrel (*unus proditor*) who wished to be provided with some deadly poisons. Avenzoar, though much terrified, nobly refused. "Wherefore, after a few days he plotted to destroy me, but by the mercy of the Creator I fled from him and escaped" (ii. 1, 5). Many other interesting cases are recorded in the *Theisir*, but space only admits the following account of "Rupture cured by rest. When a young man, I saw a friend of mine who suffered from this disorder, so that he had to give up all his usual exercises. And he got besides a great pain in his stomach through excessive eating of grapes and apples, so that he could not move without much distress and pains all over him. Then I bade him eat nothing but baked bread and boiled sparrows, and kept him perfectly quiet on his back for two months, so that he could not even say his prayers in the Moslem fashion, save in his heart. The cause being thus removed he perfectly recovered of his pains; and I then told him to continue the rest and low diet for the cure of his hernia. The rupture went back, the parts became constricted, and he got perfectly well without any other treatment. And I relate here what I remember of him that it may be an example for others in like cases" (i. 14, 1).

With the fall of the Almoravides better days dawned for Avenzoar, and both he and his son were in high favour with the Emir of Seville, who, during the persecution of the heterodox, gave him a commission outside the city. He was accused in his absence of possessing improper books. "By Allah," cried the Emir, "I sent him away that he might

escape the attacks of his enemies. Though this charge were signed by all my subjects, I would not believe it; I know what a religious man he is."

The son of the great Avenzoar was famous for his physical strength and skill in chess playing, but seems to have been less successful as a physician, if we may judge from a contemporary epigram :—

> O you, the plague and Avenzoar!
> Why rage together against mankind?
> One enemy we might endure;
> But why should we suffer you two combined?
> —Von Hammer, *Literaturgeschichte.*

The *Theisir* of Avenzoar is usually bound up with the *Colliget* of his friend and pupil Averröes. The Arabic title of this work, *Kitab ol Kollyat,* or Book of Universals, sufficiently indicates its philosophic character, and Averröes declared he desired no higher title than that of commentator on the writings of Aristotle.

As the author remarks, the *Colliget* can only be understood by persons well versed in dialectics, and even in describing the manufacture of barley water, he is as philosophic as possible: "Barley bread is inferior to wheaten, but is cooling and readily digestible, and its coldness is of the first degree. Barley water is more medicinal than the bread; it is excellent in hot and dry diseases, since it cools, moistens, tempers, and wonderfully generates a laudable humour. Nor does it inflate or remain on the stomach; all which we have learnt from experience. It should be made thus: Take one part unground barley grains, and add them to twenty parts of cold water; let them soak for four hours; then boil till the water turns reddish like wine. Thus made they do not inflate; but he who breaks or grinds them does wrong, for their inflative faculty is only removed by the infusion, and they only attract water and receive infusion by the attractive virtue they possess, which attractive virtue is a specific property of the whole seed in its totality. As, for example, is the case with the colours of precious stones,

which are properties of their combined parts, for when powdered they lose their colour." He adds that he learnt this way of making barley water from "the illustrious Avenzoar, the greatest physician since Galen" (v. 31).

Averröes is the last of the great Arab physicians, and the decline of science was due to two closely connected causes, political decadence and the revival of orthodoxy. It was because they had forgotten God, said the Moslem theologians, that the warriors of Islam turned their backs in the day of battle; and they remembered Averröes. That free-thinking philosopher was degraded from his high office of Viceroy of Cordova and banished to a town inhabited only by Jews, while, if we may trust the doubtful evidence of Leo Africanus, he was also compelled to stand at the door of a mosque, where every passer-by spat in his face. A still more legendary story relates that when told that both Christians and Moslem had devoted his books to temporal and his soul to eternal flames, he made the famous answer, "Sit anima mea cum philosophis," or its Arabic equivalent.

The orthodox reaction affected another physician, almost as famous as Averröes. Moses ben Maimon (1135-1204), now known as the Rabbi Maimonides, was studying medicine at Cordova, when the decree went forth that all Jews and Christians must accept Islam or leave the country. He conformed outwardly until he had arranged his affairs, and then went to Egypt, where he became a member of the medical staff of the Sultan Saladin, which comprised Christians, Jews, and Moslem indiscriminately. He was soon accused of apostasy from the faith, a crime which the Koran punishes with death; but Saladin's judges, with a liberality worthy of their master, acquitted him, declaring that a forced conversion is no conversion.

The medical works of Maimonides, which alone concern us here, are written in the tedious semi-philosophic style of Avicenna and Averröes, with the exception of the *Book of Counsel* addressed to the Sultan Malek al-Afdhal ben Saladin, which is of great interest, and forms the earliest

example of a form of medical literature of which we shall have much to say. Here is the preface: "There having come to the hands of the least of his slaves, Moses the Israelite of Cordova, a command from the high and mighty Prince Malek, whom may God increase in honour, that I should write instructions as to regimen by which he may safely and surely be freed from the cares and sickness that have come upon him, I pray that God will deign to remove these and all other disorders, and that perfect health may attend him all the days of his life. It has been signified to me that my revered lord complains of the hardness and dryness of his nature, whereby he cannot get natural relief without much straining and difficulty; that he is oppressed by melancholy thoughts; that he seeks to be alone, and is in fear of death; and that the weakness of his stomach prevents the proper digestion of food. Wherefore I have written the four following tractates. The first is a brief explanation of the general rules of health; the second is for those sick persons who cannot find a physician, or, at least, not one whom they can trust; the third contains the regimen proper for my lord's case, as it has been described to me; the fourth treats of matters useful to sick and well in all times and places. And let none blame me if I repeat here what I have said elsewhere, for each work must be adapted to the needs of those who require it, and to the objects of the writer. And for these things I now implore the aid and inspiration of God, the glorious, the great."

In the third tractate the writer gives some excellent rules of diet, prescribes a rhubarb and tamarind pill, a syrup of raisins and vinegar "much used by the great Avenzoar," with some other remedies of much complexity, and finally urges the Sultan to fortify his mind by the doctrines of philosophy and religion.

NOTE.

The *Surgery* of Albucasis was published in Arabic and Latin by Channing, Oxford, 1778; there is also a French translation by Le Clerc.

A partial and very poor Latin version of the rest is given in the *Liber Theoricæ Necnon Practicæ Alsaharavii*, Augsburg, 1519, and the *Liber Servitoris* (or twenty-eighth book), Venice, 1471; the *Theisir* and *Colliget* were published together, Venice, 1542; Maimonides, *Tractatus de Regimine Sanitatis*, Venice, 1521.

XXXI.—ARABIC MEDICINE. (4) HOSPITALS AND INSTITUTIONS.

ON the 14th of June, A.D. 918, our old acquaintance Sinan ben Tsabet opened the hospital founded by the Lady Seidet in the Jahya market-place at Bagdad. It had an endowment equal to £300 a month, and Sinan was head physician, but he got no pay, and himself subscribed £100 towards another hospital founded in the same year by the Caliph Moktadir. In 925 the Vizier Chakan built a hospital in the Motadhal Street, and in 977 the Emir Adad-adaula inaugurated the largest of the Bagdad hospitals, which had a staff of twenty-four medical officers, among whom we find Tsabet ben Sinan and a member of the family of Bachtishua. It is said that the great Rhazes was requested to choose a site for one of these hospitals, and that he hung up pieces of meat in various parts of the city, declaring that the one in which putrefaction last appeared would mark the most suitable position. At least two hospitals were built in the preceding century, one of them by Motawakkel's mother (about 840), while the first Moslem institution for the sick had been founded as early as 707 by the Caliph Welid, who also made special arrangements for the blind, and for lepers. The Arabic medical student had thus ample opportunities for following the advice of Haly Abbas. All the above-mentioned institutions were probably on the model of the Nestorian hospital at Gondisapor, which had existed since the fifth century, and is last heard of about the year 869, when its superintendent, Sabur ben Sahel, published the

first known pharmacopœia, which was adopted throughout the Eastern Caliphate.

When the Jewish tourist Benjamin of Tudela visited Bagdad about 1160, he found there sixty medical institutions —"All well provided from the king's stores with spices and other necessaries, and every patient who claims assistance is fed at the king's expense until his cure is completed. There is further the large building called Dar al-Maraphtan in which are locked up all those insane persons who are met with during the hot season, every one of whom is secured by iron chains until his reason returns, when he is allowed to return to his home. For this purpose they are regularly examined once a month by the king's officers appointed for that purpose, and when they are found to be possessed of reason they are immediately liberated. All this is done by the king in pure charity towards all who come to Bagdad either ill or insane, for the king is a pious man and his intention is excellent in this respect" (Asher's trans., vol. i. p. 99).

But the most famous and interesting of Moslem hospitals were those of Damascus and Cairo. About the year 1160, the Emir Nureddin, the Light and Defender of the Faith, having reconquered Edessa and driven back the crusading hosts of Louis VII. and Conrad III., founded, as an appropriate thank-offering to the God of battles, a great hospital at Damascus. "It has never had its like in the world," says Khalil Daheri, and it contained, besides departments for diseases of the eye, etc., a medical library and lecture-room, where the tall emaciated figure of Nureddin himself might sometimes be seen among the hearers.

A contemporary chronicler, Ibn al-Athir, relates that on returning from a visit to Jerusalem about 1184 he was indisposed, and called in a doctor, a native of the Maghreb (Morocco), who treated him very rudely. So he dismissed him and tried to cure himself, but got worse. "Then I rode into the city (Damascus), and asking the address of a physician, was directed to the great hospital. On my entrance,

the superintendent came to me and inquired most affably into my case. Then he wrote a prescription, saying: 'Your attendant will bring you what is written on this paper'. 'But, sir,' said I, 'thanks be to God, I am rich enough to pay for my drugs without trespassing on the property of the poor.' He replied: 'Sir, I doubt not that you can do without our medicines, but here no one despises Nureddin's benefits. In the name of God, I assure you that Sultan Saladin's sons and their whole families send here for medicines, and never pay.' I answered that I could not approve of that. 'It was Nureddin's desire,' he continued, 'to be useful to all believers, rich or poor.' My mind being thus set at ease, I told him my adventure with the other doctor. 'Sir,' said he, 'an African who has lived at Damascus does not know how to behave otherwise. (The Damascenes were and are notorious for rudeness.) If I am courteous to all, I owe it to your countrymen, for I have sojourned for some time in Mosul and Irak.' Then I thanked him, and departed."

The hospital was conducted in a manner equally regardless of expense nearly three centuries later. The above-mentioned Khalil observes: "While making the pilgrimage to Mecca in 851 (1427) I stayed at Damascus, and had with me a certain Persian, a man of wit and intelligence, who followed the rites of the four orthodox sects, performing them all at the same time. When he went over the hospital and saw the patients' diet, and all their comforts and advantages, which are without number, he pretended to be ill and stayed three days there. The physician having felt his pulse recognised his case and prescribed any diet he liked, so he was fed upon young chickens, cakes, and sherbet, and all manner of fruits. But after two days the doctor wrote a prescription implying that a guest should not stay beyond the third day. They say the fire has never been put out at this hospital since it was built."

Ahmed ben Toulun, the first independent ruler of Egypt, founded, we are told, a hospital there in 874, at a cost of about £30,000. It contained two baths, for men and women

respectively, and a department for the insane, and Ben Toulun visited it every Friday—the Moslem Sabbath—till a lunatic threw an apple at him, after which he came no more, though he still took an interest in the place.

Behind the great mosque, which still preserves his name, Ahmed established a dispensary, where physicians attended every Friday, and dispensed advice, drugs, and sherbet (!) gratis. His expenditure in charity equalled £500 (1000 dinars) per month.

All writers agree in ascribing the first place among Moslem institutions for the sick to the great Mansuri hospital at Cairo. Al-Malek al-Mansur Gilavan, before he became Sultan, was campaigning in Syria against the Greeks, 1276, when he was seized with an attack of colic. Being relieved by medicines from the hospital founded by the "Defender of the Faith" at Damascus, he vowed in his gratitude that he would one day build a yet nobler institution. Soon after he ascended the throne this vow was fulfilled, and such was the zeal of the Sultan and his officials that the hospital, which was begun in June, 1283, was completed in May, 1284. Masons and carpenters were brought from all parts of Egypt; loiterers in the street and passers-by, whatever their rank, were obliged to assist in the holy work, insomuch that "most people avoided going that way"; and the favour of heaven was strikingly manifested by the discovery of two copper caskets filled with gems and gold respectively of sufficient value to defray all the expenses of the building. The hospital was endowed with an income of about £25,000, and contained four great courts, each with a fountain in the centre, wards for each separate disease, a lecture-room, and a department for attending patients at their own homes. It also included an academy, an orphanage, and a chapel, where fifty chaplains recited the Koran day and night without intermission for all who chose to hear. Musicians and story-tellers were provided for the benefit of those troubled with sleeplessness, and the convalescent patient received at his departure five pieces of gold—about fifty shillings—that he might not be obliged to return to work immediately.

With regard to Western hospitals, we have little information except the vague and probably exaggerated assertion that there were fifty such institutions in Cordova, but a fragmentary manuscript has survived, which gives an interesting picture of how medicine was taught among the Arabs in the days of William the Conqueror. Mohammed Ettiminy, a medical student at Toledo about the year 1066, has left us part of a note-book containing descriptions of fifty cases treated by his "master," perhaps in the out-patient department of the local hospital. The following is the sixteenth case from the French of Le Clerc. "A man came and said he had a swelling on the upper eye-lid like a wart. My master told me to go and feel whether it was movable or not. I did so, and if moved like a pea under the skin. When I told him this he bade me evert the eyelid and see if it projected internally. I found nothing. Then he said: 'That is the disease called chalazion; rub it with olive oil, and apply a bread poultice.' The patient did so for some days, and was cured. 'Shall I send him away?' said I to my master. 'Yes, if you know what chalazion is, and how many kinds there are.' 'Three!'" Then the master gives a description of chalazion and its varieties.

Avenzoar was at one time superintendent of a hospital at Seville. Skin eruptions, he remarks, are sometimes due to bad food. Lizards, for instance, are not wholesome, nor is water in which lizards have lain good to drink. "When at the hospital I noticed that the drinking water had an unpleasant smell, which increased daily. Thinking some animal might have fallen into the well, I sent a man down to see. He found there a great number of dead lizards, some of which were putrid, but others not. Fearing I might have been poisoned I began to take theriac, and so escaped. But some time afterwards pimples appeared on the tip of my nose, so I at once applied theriac to them, for I saw that Nature was thus expelling the poison imbibed with the lizard water" (ii. 7, 10).

Gastric cancer (*verruca stomachi*) may be caused, or at

least aggravated, by improper food. "When I was superintendent of the hospital, I found there a man with this disease, very weak and emaciated. Under my treatment he recovered strength and began to put on flesh; but he afterwards took to eating bad food and sank rapidly" (i. 15, 3).

As an example of the academies which existed in all the great Moslem cities we may take the "House of Wisdom" or "Hall of Science" at Cairo, founded by the Caliph Hakem Bimrillah, and opened Saturday, 24th May, 1005 (10th Dschemadi A.H. 395).[1] It was well furnished, and decorated with carpets and curtains; books on all subjects were taken to it from the royal libraries, and lawyers, astronomers, grammarians, and physicians gave lectures periodically. "Every one was admitted without distinction. Some came to read, others to copy the books, others to attend the lectures of the different professors. They found there all the pens, ink, and paper they could require." So successful were the lecturers that, in 1012, Hakem invited them to his palace, conversed with each separately, and dismissed them loaded with presents and robes of honour. We even possess the annual accounts of the institution. Copyist, forty-five pounds (ninety gold dinars); librarian, forty pounds; pens, ink, and paper, six pounds; repair of books, six pounds; attendant (carpet spreader), seven pounds ten shillings, with five dinars extra for clothes. Unhappily, two visitors to the reading room, Berekat and Hamid ben Mekky, began, in 1122, to give unauthorised and highly heretical lectures on theology, and the Sultan Afdahl ordered the place to be closed at once. It was reopened under his successor on condition that everything should be strictly orthodox. Berekat was dead, but Hamid returned a worse heretic than before. He gave himself out as a Messiah or Mahdi, and deceived many, declaring that he was invulnerable; so they cut out his tongue and shot him to death with arrows. But

[1] lectures at the Hall of Science were thenceforth confined adings from the Koran and approved commentators.

There were also associations for the furtherance of special sciences, as for instance the chemical society at Fez, thus described by Leo Africanus: "There is there a most stupid set of men (*stupidissimi homines*) who contaminate themselves with sulphur and other horrible stinks. They are wont to meet in the evening at the principal mosque and there dispute over their vain imaginations."

If it be true that the Arabs burnt the Alexandrine Library, they certainly did their best to atone for that crime. Even private individuals possessed libraries containing over 100,000 volumes: that of the Mansuri Hospital was so extensive that it required six librarians, and immense collections were accumulated at Bagdad, Bokhara, Cairo and Cordova. But they have all vanished before the combined destructive energies of savages and theologians. When the Berbers invaded Egypt they carried off the rich bindings of the books, and threw their contents in two heaps, which were covered with sand, and formed conspicuous mounds, long known as the "Hills of the Books". When the Mongols destroyed Bagdad, we are told that they used the remains of the libraries to build a bridge over the Tigris, the waters of which great river ran black with ink for many days. In Spain, the Regent al-Mansur, acting on the advice of theologians "and other austere persons," burnt the whole of Hakem's great library, except those books which treated of useful arts or orthodox religion. The holy office is said to have destroyed at least a million Arabic volumes, and Cardinal Ximenes cast 5000 copies of the Koran into the flames with his own hands. Many medical works, doubtless, perished at this period, and we must especially regret the *Book of Histories of the Bagdad Hospital* and the *Autobiography*, both attributed to the great Rhazes.

The decline of the Arabic power was nearly as rapid as its rise. In 1236, St. Ferdinand of Castile took Cordova, and twenty-two years later a more terrible destruction fell upon Bagdad at the hands of the Mongols. That city, indeed, rose again from its ashes, but the town which had

formed the cradle of Arabic medicine was swept from the face of the earth, and future travellers sought in vain even for the ruins of Gondisapor.

NOTE.

The fullest account of Moslem hospitals is that by Macrizi, translated by Wüstenfeld in Henschel's *Janus*, vol. i. For Nureddin's hospital see his life by Von Hammer in his *Gemäldesaal*. The quotations from Khalil are from Silvestre de Sacy's translation of *Abdallatif Relation de l'Egypte*, Paris, 1810; Ibn al-Athîr's chronicle is printed (French and Arabic) in the *Recueil des Historiens des Croisades*, Paris, 1877. The history of the "House of Wisdom" may be found in Quatremère, *Mémoires sur l'Egypte des Manuscripts Arabes, etc.*, and in Hammer's *Gemäldesaal* (*Life of Hakem*).

XXXII.—GENERAL SURVEY OF ARABIC MEDICINE.

THE extent to which our history has degenerated into anecdote indicates how little there is to tell of actual progress in medicine during this period; but the superstitious awe with which mediæval Europe regarded Arabic science has perhaps been replaced by a somewhat exaggerated depreciation. We are told that the Arabs did nothing but copy and translate from the Greeks, and that those who did this best were not genuine Arabs, but Syrians, Jews, and Persians. In the preceding chapters I have attempted to show that they are not without higher claims, and shall now briefly recapitulate some of their chief services to the healing art.

In an age when no Christian monarch, with the rare exceptions of Charlemagne and Alfred the Great, troubled himself in the slightest about the education of his subjects or the progress of science and literature, we find Caliph after Caliph, and Vizier after Vizier establishing schools and libraries for the public benefit, and filling their courts

with physicians and philosophers. Their remarkable generosity to the former would alone entitle them to the gratitude of the profession; and even had the Arabs themselves made no scientific discoveries, they would at least deserve the praise of having encouraged others to do so.

Here are a few examples of medical fees. A Nestorian physician received from an Arab princess so large an amount in a single payment that he was able to found and endow a hospital therewith. Another, who was also a priest, and perhaps a bishop, was presented by a Moslem emir with a sum equal to £2000, together with slaves and horses; but he returned them all, for he had made a vow to practise gratis. The Caliph Nasr was to have been cut for stone, but he recovered from his disorder after taking medicine prescribed by his physician Abu Nasr. Like Democedes of old, that fortunate man was conducted through the harem, and received from the patient's mother, aunts, sisters, and wives, a sum equal to £12,000 in gold, besides jewels and rich dresses innumerable. The wealth of Gabriel Bachtishua has already been noticed, and among the items of his income which have come down to us are the following: "For bleeding the Commander of the Faithful twice yearly, £150 per annum. For purging his Highness twice in the year, the same sum." The Caliph further paid him a regular salary equivalent to £500 (or according to another authority £1000) a month, and every New Year's Day he received a present of £1250 with several robes of honour. On the accession of Al-Mamun he was banished on charge of political conspiracy, and Michael Mesuë took his place; but the Caliph being seized with an illness which neither Michael nor John Mesuë could cure, Gabriel was recalled and received for his successful treatment his whole former possessions, with the addition of a million dirhems (£25,000), probably the highest fee on record. (Von Hammer.)

We must here pass over the mysterious Geber, father of chemistry, the *magister magistrorum*, as Friar Bacon called him, as well as the great Moslem botanists, astronomers, and

mathematicians, and confine ourselves to the strictly medical sciences. The followers of the prophet looked upon the dissection of human bodies with still greater horror than did the mediæval Christians, and their religious guides held that even the question as to its legality was itself unlawful. Yet it was an Arabic writer who first pointed out the imperfections of the Galenic anatomy. When the physician Abdallatif was in Egypt, the conversation turned one day upon the superiority of observation to mere reading; and some one remarked that there was a great heap of skeletons and dead bodies at Maks. So Abdallatif went there, and found a hill consisting rather of corpses than of earth, and with more than 20,000 skeletons exposed on the surface. The delighted physician proceeded to examine these, and at once noticed that the lower jaw consists of one bone, and not of two as described by Galen. He tells us that he examined 200 lower jaws in every possible way, and got others to examine them also, both in his presence and absence, and they all came to the same conclusion. Similarly he observed that the sacrum is composed of a single bone, and he expresses his intention, "if Providence permits," of writing a book of revised anatomy comparing Galen with nature.

The Arabs invented the apothecary, whom they called "Sandalani," sandal-wood forming a common ingredient both of internal medicines and outward applications, though the peculiar virtues of the oil do not seem to have been recognised. An ambitious or fortunate apothecary sometimes developed into a physician, as is shown by the following anecdote, which also exemplifies the exaggerated importance which the Arabs, and the mediæval physicians after them, paid to uroscopy. Issa al-Sandalini was standing one day at his shop door in Bagdad, when a harem attendant went by carrying a urine glass to a neighbouring physician. "Whose is that?" asked Issa. "Some old woman's." "Say rather the mother of a mighty prince," replied the joking apothecary. The Caliph al-Mahdi heard the story, and when his favourite wife presented him with a son,

the fortunate Issa was astonished to receive £150, two robes of honour, and an appointment at the palace. He was equally prosperous under al-Mahdi's son, Harun al-Rashid. That immortal Caliph, disgusted with the corpulence of his cousin, Issa ben Giafar ben al-Mansur, declared he would give £5000 to any one who would make him thin, and that the patient should pay an equal sum. Issa, the apothecary, got the money, but his mode of treatment has unfortunately not been preserved. Arabic physicians seem to have been specially skilful in the treatment of corpulence. Here is another instance: King Sancho, of Leon, was so fat that he could no longer mount a horse, or even walk without support. Wherefore his subjects ridiculed him, and finally deposed and drove him out of the kingdom in the spring of the year 958. He fled, or rather was carried, to his grandmother, Tota, Queen of Navarre, who swore to restore him at any cost, even that of alliance with the Saracens; so she sent an embassy to the great Caliph of Cordova, Abdurrahman III., requesting an army and a physician. Both were sent, and both were successful. The Saracen armies were accompanied by apothecaries, for we hear that on one occasion the General Afchin (about A.D. 830) wrote an imaginary prescription, and sent it to all the apothecaries in the camp in order to test their honesty. Some declared that they had no such drugs, but others made up the prescription in various ways, and these he dismissed as ignorant pretenders.

Arabia Felix was the land of myrrh and frankincense, and we owe to the Arabs the introduction of several new remedies, of which senna was the chief; but it would be difficult to name half a dozen drugs the use of which certainly originated with them. Some they borrowed from the Hindus, as, for instance, aconite and mercury, which were employed externally in certain skin diseases, and they were indebted to that people in other sciences as well as medicine. We have seen that the chief Hindu medical works were early translated into Arabic, and Hindu physicians were to be found in the ninth century, both at Bag-

dad and Gondisapor. Harun al-Rashid's uncle, Ibrahim, was once so ill that the caliph's physician, Gabriel Bachtishua, gave him up, so Giafar, the vizier, recommended the Hindu, Sahleh, son of Bahleh. Sahleh declared confidently that he would cure the patient, and the caliph celebrated this favourable prognosis by a grand banquet. Hardly had he finished when the news came that the prince was dead, and Harun thereupon cursed the grand vizier, the Hindu physician, and Hindus generally, for that he had feasted while his uncle was dying. Then, having drank warm wine, mixed with salt and water, till he got rid of all he had eaten, he went to Ibrahim's house, and sat on the floor mourning. Sahleh, however, declared the prince was still alive, and to prove it ran a pin under his thumb nail, and put something in his nostrils, which made him sneeze. In due time he completely recovered, and Harun confessed that the Hindus were ever better physicians than the Greeks.

The first pharmacopœia was issued, as we have seen, from the Hospital at Gondisapor, but of more importance are the works on materia medica ascribed to Mesuë the Younger († 1015), of whom we know little more than the name. These formed the foundation of the Western pharmacopœias, were published in more than thirty editions, and were consulted up to the beginning of the last century. In them we find most of the drugs which were either introduced or brought into more general use by the Arabs, such as senna, rhubarb, camphor, cloves, cassia, manna, musk, nutmeg, tamarind, cubebs, orange, lemon, gold, pearls, ambergris, bezoar stone, syrups, juleps, and the products of distillation, such as rose-water and alcohol.

The following is an extract from the Gondisapor pharmacopœia preserved by the younger Mesuë: "A confection of poppies profitable (with God's help) to one who spits blood in inflammation of the chest, and in pleurisy. Take confection of roses and gum-arabic, of each three drachms; starch, tragacanth, poppies, of each two drachms; liquorice juice,

two drachms; spodium (impure zinc oxide?) and saffron, each half a drachm. Make up with syrup of poppies, and give in rain water, myrtle syrup, or syrup of poppies."

Besides the above-mentioned services to medicine, the Arabs also carefully described several new diseases, especially small-pox and measles; we shall see that it was probably from them that the first regulations as to medical education were copied, and, above all, that it was their writings which mainly contributed to that brilliant though abortive revival of learning which marks the thirteenth century.

NOTE.

Al-Hakem II. (to take one of many instances) built twenty-seven additional schools at Cordova, and paid the teachers out of his own pocket.

The story of Sancho is from Dozy (*Histoire des Musulmans d'Espagne*, iii. 80). The physician, Chasdai ben Chaprout, was a Jew educated in the Arab schools.

The existence of Mesuë the Younger rests mainly on the evidence of Leo Africanus, a most unreliable writer, who says that he was physician to Hakem Bimrillah, and died 1015. If so, he may have lectured at the "House of Wisdom". But as no Arabic authority mentions him, and no Arabic versions of his works are known, some consider that a Latin compiler of the tenth or eleventh century has assumed the name.

XXXIII.—THE DARKEST AGE.

MANY people object to the epithet "dark" as applied to the middle ages, and some have even wished themselves back in that romantic epoch of chivalry and troubadours, crusades and cathedral building; but there can be little doubt of the propriety of the term when used to indicate the state of Western Europe from the fifth to the eleventh century. Science and literature, if we may use those words at all, were confined to the clergy, and how little they possessed the following facts will show. A Spanish synod of the

seventh century decreed that no one should receive priest's orders in future unless he could at least read the psalms and the baptismal service. In Italy, about the same time, a patriotic historian can find only three schools, and he doubts whether much more than bad reading was taught at any of them. France was still more unfortunate, for we are told that under Charles Martel what schools remained were presided over by discharged soldiers, who could neither read nor write. England was a brilliant exception. Archbishop Theodore had brought with him from Tarsus a Greek library, and the school of Canterbury produced men who could read Homer, and, what is more to our purpose, could translate Dioscorides. But with this exception Greek was unknown in Western Europe, and Greek was still the key to all higher knowledge, especially in medicine. Latin versions of some Galenic treatises, indeed, existed, but they were so little known that Constantine the African could boast in the eleventh century that he was the first to translate that author. Celsus, whose work might have formed an excellent text-book, was almost entirely forgotten, and though Cassiodorus urged his monks to read the *Methodic Compendium* of Cælius Aurelianus, the extreme rarity of the manuscripts indicates that his advice was seldom followed.

The Empiric school reigned without a rival, but that great medical sect had sadly degenerated since the days of Heraclides. Two legs of its famous "tripod" had given way altogether, for the later Empirics were incapable of scientific "observation," and would not have understood the meaning of "analogy". "History" still remained, but was chiefly comprised in the *Natural History* of Pliny the Elder, from which such medical writers as Theodore Priscian, Pliny Valerianus, Quintus Serenus, and Sextus Placitus largely borrowed, preferring always the more marvellous statements of that credulous compiler, and adding a few absurd or disgusting prescriptions of their own. The following examples may suffice: "Asses' dung dried and used as a dentifrice," says Priscian, "will immediately cure toothache,

and it is equally effectual when mixed with vinegar and held for some time in the mouth". "If a child kisses a horse's nose," declares Sextus Placitus, "he will never have toothache, but take great care the horse does not bite the child." Two members of the school, Apuleius and Marcellus Empiricus, deserve more special consideration, and their works represent the two types on which all the medical books of this period are written. Apuleius gives the names of various herbs, followed by lists of the diseases they will cure; while Marcellus enumerates diseases in order from head to foot, adding their various remedies, magical or rational, but neither pays the least attention to diagnosis, prognosis, or any other division of medical science. The former writer is also interesting as showing the transition from heathen to Christian medicine. Apuleius was a pagan, and in the oldest manuscripts the names of various herbs are followed by prayers and incantations to be recited on gathering them, handed down, perhaps, from the old Greek or Tuscan herbalists; but the monkish transcribers have converted him into a Christian by the simple process of slightly altering these prayers; while, in later editions, they are either omitted altogether—as in the Anglo-Saxon version—or replaced by the Creed and Pater Noster, which the canons of the Church declared might alone be repeated on such occasions.

But the incantations of Apuleius are sense and soberness compared with those of his Christian successor, Marcellus (A.D. 480). "If a man's nose bleeds whisper in his ear on the same side, 'socsocam sykyma,' thrice nine times—and you may still go on saying it." Toothache, if it occurs on a Tuesday or Thursday, and if the moon is waning, may be cured by repeating seven times "argidum margidum stargidum". Even his prayers compare unfavourably with those of Apuleius: "In ophthalmia look out for the first swallow, then run silently to the nearest spring, wash your eyes, and pray God that you may be free from it for that year, and that all the pain may pass into the swallow". "A very long-

legged white spider rubbed up with oil removes white spots from the eye if assiduously used, therefore mind and rub up a good many with sufficient oil lest the medicine be exhausted before the cure is complete." Marcellus is said to have been a man of great seriousness and piety, or we might be tempted to think that he was amusing himself at the expense of his readers.

The whole book is full of similar absurdities, which he defends by the invariable Empiric argument that patients have got well after practising them.

We must not, however, suppose that this superstition was in any way favoured by Christianity. It was indeed a Christian bishop who introduced the disastrous doctrine that the signs of the zodiac preside over the various organs of the human body; but the Church disapproved both of the science and the theology of Priscillian, and he was executed as a magician and heretic (A.D. 385). Besides condemning magic, the Church further attempted to direct the excessive faith in the supernatural into higher channels. Instead of invoking Juno Lucina, and other heathen demons, the young mother was encouraged to repeat the 18th Psalm, and to think of the wonderful deliverance of St. Margaret, when swallowed by Satan in the form of a dragon. Did a man suffer from toothache, or colic, or pains in the back? Let him, instead of decking himself with pagan amulets, consider how much greater pain of those various kinds was endured by St. Apollonia when all her teeth were knocked out; by St. Erasmus when his bowels were torn from his living body; or by St. Lawrence when he was roasting on the gridiron. And in his prayers for health he would naturally introduce the names of those holy martyrs, or of other saints who were similarly connected with other diseases, with a firm faith in their effectual intercession.

New superstitions, however, soon appeared remarkably resembling those they replaced. Just as plagues and epidemics were universally ascribed to the wrath of God, so particular diseases came to be attributed to the anger of

particular saints, while, on the other hand, even the images of other saints were accredited with magical powers of healing; the very sight of a picture of St. Christopher, for instance, sufficed to protect a person from sudden death for a whole day, as is evidenced by the ancient doggerel:—

> "O Christophore sancte, virtutes sunt tibi tantæ,
> Quis te mane videt nocturno tempore ridet".

Beliefs like those described above were chiefly confined to the ignorant, but there was another doctrine which threatened not only the progress, but the very existence of medicine, and which was taught by great theologians. If prayer and saintly intercession will heal the sick, is it not an impious want of faith to employ earthly remedies at the same time? Many distinguished rulers of the Church declared that it was. Thus St. Gregory of Tours rebukes Leonastes the archdeacon because, while trying to cure a disease of his eyes by fasting and prayer at the shrine of St. Martin, he had also called in the aid of a physician. What else could he expect from such an impious proceeding but complete blindness, which actually happened to him? The physician was a Jew, which made the sin worse, as St. Gregory proves from 2 Cor. vi. 14-17; and he concludes with the moral: "Wherefore let this case teach every Christian not to seek earthly aid when he has merited the assistance of heaven". The bishop would probably have used severer language had he not himself been conscious of a similar error; for once, being troubled with headache, he had not only touched the painful spot with the curtain from before the tomb of St. Martin, but had afterwards been bled by a surgeon; and the thought occurred to him, "as I believe by a suggestion of the enemy," that he might have been cured thus without St. Martin's intercession. He harboured this profane imagination, and was at once punished by a second headache worse than the first, from which he was only relieved by prolonged penitential prayer at the shrine of his predecessor.

At a much later period, we find St. Bernard of Clairvaux strictly forbidding his sick monks to have anything to do with physic or physicians. Let them think of the words of the apostle (2 Cor. xii. 9), and hesitate to use earthly remedies at the risk of their eternal salvation. The occasional use of herbs from the monastery garden may, indeed, be tolerated; "but to buy drugs, to consult physicians, to take medicines, befits not religion (*religioni indecens est*), and is contrary to purity, and especially is it contrary to the purity and honour of our order, for after all these things do the Gentiles seek, but we know that they who live in the flesh cannot please God". Yet even Cistercians sometimes took medicines, as we learn by the following letter from the saint to one of his abbots: "Know that Brother G——, since he came from Christa, where he took medicines, has had no indulgence in diet, neither has he been excused the usual vigils. Should he, therefore, attempt to obtain these privileges with you, consent not, for you may be certain that it is not his body but his spirit that is affected. Farewell." Had Brother G—— avoided medicines, he might, perhaps, have been treated with less suspicion, if not with more indulgence.

The earliest French writer on surgery, Henry of Mondeville, says that in his time many patients thought all diseases except wounds and fractures came from God, and therefore refused to be treated by ordinary practitioners or by earthly means. "These fall into the hands of fraudulent monks (*religiosi ficti*), hermits, recluses and the like, who pretend to cure them in a supernatural manner by holy water, prayers, and incantations. No such powers, however, were claimed by a certain surgeon known to me, who, while he was pounding up a medicine for the cure of fistula, vulgarly called the disease of St. Eligius, accidentally broke his mortar. Thereupon arose a great scandal against him, and it was said that this was a miraculous judgment upon him, because he presumed to treat diseases belonging to saints which ought to be reserved for divine surgeons."

The idea that the highest piety is incompatible with the use of medicine comes out also in the legends of the saints, and we may find a striking instance of it in the story of St. Agatha. According to her biographer, Simeon Metaphrastes, St. Peter appeared to her in prison under the guise of an aged leech, and offered to heal her wounds. But the saint repulsed him with horror. Never in her life, she declared, had she used other means than prayer for the cure of diseases; was she likely to fail now? And the apostle was finally obliged not only to reveal his name and mission, but to accomplish the cure without the use of physical remedies.

But most were less scrupulous, and one of the pleasantest pictures in an age presenting little of that character is the peaceful monk, gathering his herbal simples and brewing therefrom decoctions which were, doubtless, comforting to the minds, and sometimes also to the bodies of his neighbours. A specially attractive figure is that of Walafrid with the Squint (Strabus), monk of St. Gallen and Abbot of Reichenau, A.D. 850, who has left us twenty-three little poems, in excellent Latin, on the favourite herbs in his monastery garden. For outward griefs he considers nothing equal to oil of roses, the virtues of which are innumerable:—

> "Quod quam sæpe fiat mortalibus utile curis,
> Nec meminisse potest hominum nec dicere quisquam".

But in internal affections he gives the palm to a decoction of horehound, which is equally valuable in respiratory and digestive disorders, and will even counteract the poisons of malicious stepmothers!

To the long list of Arab patrons of science during this period we can only oppose two names, those of Alfred the Great and Charlemagne. The former had, perhaps, something to do with the origin of the curious *Anglo-Saxon Leechdoms*, which the reader will find translated in the Master of the Rolls' series. They comprise imperfect translations from the works of Dioscorides, Apuleius, and Sextus Placitus

together with a few original productions, which, however, display the wit rather than the wisdom of our ancestors. Here are two examples: "Against a woman's chatter: take at night, fasting, a root of radish; that day the chatter cannot harm thee". "In case a man be a lunatic: take skin of a meer-swine or porpoise; work it into a whip; swinge the man therewith; soon he will be well; Amen." Charlemagne seems to have done less for medicine than for other sciences, for, as his biographer Einhard tells us, "he especially hated physicians because they tried to make him take his meat boiled instead of roast; wherefore he seldom consulted them, but treated himself when ill, which rarely happened till the last four years of his life". In 806, however, he ordained that children (*infantes*) should be sent to learn medicine, and it is perhaps the practical results of this edict which are quaintly and prophetically described in the following lines by his English "Minister of Education," Alcuin :—

> "Accurrunt medici mox Hippocratica tecta,
> Hic venas fundit, herbas hic miscet in ollâ
> Ille coquit pultes, alter sed pocula praefert."

"Soon hasten to halls Hippocratic in crowds the medical students;
One is opening a vein, another is stirring a mixture,
Here one is cooking the gruel, there one is dosing a patient."

But the passage itself is so obscure, and the great emperor's institutions so entirely vanished in the disorders which followed his death, that it is impossible to decide whether he intended to establish medical schools, or by making some knowledge of the science universal, to entirely abolish a profession which held such strange views on the relative excellence of roast and boiled meats. He seems, however, to have done something for the furtherance of State medicine; for, according to Haeser, he admitted the ecclesiastical ordinance that each parish should care for its poor into his code of laws, declared the hospitals to be State institutions, and had them inspected periodically by special officers (*missi dominici*). Finally, Charlemagne benefited the

healing art by commanding that useful plants, especially those of a medicinal character, should be cultivated on all the royal farms.

NOTE.

The relics of St. Margaret were regularly brought to the lying-in room of the queens of France up to the end of the last century. Here is her invocation: "Deus, qui gloriosam Margaretam invocantibus salutis remedia promisisti, exaudi nos pro N. famulâ tuâ in martyris tuæ suffragio confidente," etc. (from the Alsatian missal). The same authority gives the following form of invocation of St. Sigismund in cases of ague: "Omnipotens et misericors Deus, qui subvenis in periculo laborantibus, qui temporas flagella dum verberas, inclina tuas benignas aures ad preces humilitatis nostræ, et hunc famulum tuum N. qui tertianâ (vel quartanâ vel quotidianâ) febris vexatione fatigatur martyris tui et regis Sigismundi supplicatione ab omni ardore febrium liberare dignas," etc.

Persons with toothache also appealed to St. Ursmar, who had suffered therefrom for nine years; and to St. Medardus, who had such a magnificent set of teeth, and showed them so often (at least in his pictures) that "to grin like St. Medardus" became a mediæval proverb. In headache St. Just was invoked, for a red-hot helmet had been put on his head at his martyrdom. St. Stephen, for obvious reasons, was the patron in cases of "stone"; and St. Benedict held the same office, owing to his famous cure of the Emperor Henry. The eloquent St. Catherine of Alexandria was invoked in diseases of the tongue. St. Ottilia, though born blind, had received her sight in the waters of baptism, and therefore was the intercessor in eye affections, with which St. Clara and St. Lucy were also connected, apparently because of their names. The same reason made Eutropius the healer of dropsy (hydrops), and St. Matthias the defender from drunkenness (amethyst). But a diligent student of the *Acta Sanctorum* might enlarge this list almost indefinitely.

Most of the medical works here quoted may be found in a collection entitled *Medici Omnes qui Latinis Litteris scripserunt* (Venice, 1547). Marcellus, who held a high office at the court of Theodosius, was not a physician, and wrote his *De Medicamentis* for the benefit of those unable to obtain medical attendance. It has recently been republished in Teubner's Latin series (Leipsic, 1889).

For Priscillian see St. Leo, *Epistola*, xv.: "Ad hanc insaniam (Priscillianism) pertinet prodigiosa illa totius humani corporis per duodecim signa cœli distinctio, ut diversis partibus diversæ præsideant potestates";

and for the relation of saints to diseases, Reuss, *Introd. ad Opera S. Hildegardis*, in Migne's *Patrologia;* Calmei, *Characteristiques des Saints*, and the *Acta Sanctorum* generally. St. Gregory of Tours, *Hist. Francorum*, v. 6; *De Miraculis S. Martini*, ii. 60; *De Gloria Confessorum*, cap. xcv., contains a curious account of how St. Medardus cured toothache. St. Bernard, *Ep.* 345 and 405 (Migne's edition, i., pp. 550 and 617). The works of Abbot Walafrid are published in Migne's *Patrologia*. Alcuin, *Carmina*, 228. For Charlemagne's laws see Pertz, *Monumenta Germaniæ Historica*, vol. ii.; *Capitularia Karoli Magni*. Among the plants he ordered to be specially cultivated were poppy, anise, dill, feverfew, wild cucumber (elaterium ?), coriander, mint, rosemary, sage, rue, tansy, squill, hemp, linseed.

The sketch which appears in the early portion of the work shows the north-east part of the monastery of St. Gall, as it appeared between A.D. 830-937, and represents what is probably the most ancient existing plan of an infirmary. In the centre is the chapel, with its altar at the west end, to connect it with that of the abbey church. North of this are the infirmary buildings, including a special department for those who had been bled, or had taken purgatives, processes which the monks seem to have gone through periodically, venesection being performed in the infirmary kitchen. The reader will admire the excellent arrangement of the "necessaria". To the east is the doctor's house, of which Walafrid Strabo was perhaps one of the earliest occupants, and next to it the physic garden. The original plan, still preserved at the monastery, is said to give the names of the plants to be grown in each plot; but these are unfortunately omitted in the copy from which our sketch is taken. The "pyralia" were the warm rooms of the monastery, where the monks sat in very cold weather, where clothes were dried, and in one of which the rods were kept. This last fact caused the destruction of the building in 937. On the feast of St. Mark (25th April) in that year some scholars behaved in a manner worthy of stripes, "as they usually did on feast days," says the chronicler Ekkehard. They were ordered to strip, and one of them was sent to the "pyrale" for the rods. In the hope of saving himself and his comrades, he took a brand from the hearth and thrust it into the dry wood under the roof. The flames spread to the church, and the abbey was almost entirely consumed.

XXXIV.—THE SCHOOL OF SALERNO.

SALERNO, or Salernum, a town beautifully situated on the Italian coast, about thirty miles south-east of Naples, was,

even in the time of Horace, a favourite health resort of the Romans, its air being considered more bracing than that of Baiæ. In Christian days it became yet more attractive to the sick, for its cathedral contained what were believed to be the wonder-working relics of St. Matthew; and if three other shrines claimed the head, and seven the body of the evangelist, the bones of the holy virgins, Theckla, Susannah, and Archelais, were unique and hardly less effective.

Where patients congregated doctors would naturally follow. In the ninth century we already hear of distinguished Salernitan physicians; in the tenth we find one of them at the French court, while bishops and nobles travel from great distances to Salerno, for medical aid; and during the next two centuries the fame of *the Hippocratic city* spread throughout Europe. But its decline was equally rapid; and when, in 1811, an edict of Napoleon put an end to the most ancient of universities, even professed historians knew little more than that it had been a great medical school founded by Charlemagne, or the Saracens, or Constantine the African, or, at any rate, by the Benedictine monks. The accidental discovery at Breslau, in 1837, of thirty-five manuscripts by distinguished Salernitan masters, encouraged and assisted further investigation, and the following is a brief outline of our present knowledge.

Only the last of the above theories as to the origin of the school deserves consideration, and among many arguments which conclusively prove that it was not a monastic but a secular institution, we need only mention that Jews and women were connected with it from early times, and that many of its professors were married, and some rich, and could therefore be bound neither by vows of chastity nor poverty. Law and philosophy were soon added to medicine; but theology, if ever taught at all, was the last of the faculties to complete the "Studium generale," or University of Salerno. The ancient chronicles of the city declare that the school was founded by four masters, Abdallah (Adala) the Arab, Eli (Elinus) the Jew, Pontus the Greek, and Salernus the Latin,

who lectured to their pupils each in his own tongue. It would be pleasant to believe that representatives of the four divisions of civilised men, then persecuting and warring upon each other in the name of religion, had met together in this beautiful spot for the peaceful study of our sacred art. But the story is clearly mythical. Abdallah had but lately issued from his deserts when the school originated, and he would have found Salerno an unpleasant abode at any time, for it was first an outpost of Christianity against the Saracens, and afterwards a favourite halting place for crusaders. The others, however, may be accepted, at least allegorically. The earliest known Salernitan doctors bear the Jewish names Joseph and Joshua: numerous Greeks, as we have already seen, came to Salerno during the iconoclast persecution, and the formation of the school may not unreasonably be attributed to the combination of these elements with the remains of an ancient Latin "collegium medicorum".

The golden age of Salerno lasted from A.D. 1000 to 1200, and these two centuries form two epochs roughly divided by the interesting episode of Constantine the African. The first period is distinguished by the names of Gariopontus, the elder and younger Platearius, and the elder and younger Copho. Gariopontus, who seems to have been a Greek, wrote the *Passionarius*, a medical compendium, in which the doctrines of the Methodists are combined with prescriptions taken from Galen, Alexander, Paulus, and the Empiric writers already mentioned. The younger Platearius was the author of the *Practica*, a collection of notes on treatment, in which he often quotes his father's opinions and practice, while to one of the Cophos is due the first modern anatomical treatise, the *De Anatome Porci*, a work describing the shape and position of the viscera of the pig, which animal, says the author, resembles man internally just as the monkey resembles him externally. At the close of the century appeared the most famous product of the school, the *Regimen Sanitatis, Schola Salernitana*, or *Flos Medicinæ*, as it is variously called, a medical poem, which went

through more than 240 editions, and was translated into nearly every civilised language. It consisted originally of about 360 irregularly rhymed hexameters, or "Leonine" verses, and was dedicated to Robert of Normandy, son of the Conqueror, who stayed at Salerno to be healed of a wound in his arm. In it we find the entire popular and proverbial medicine of the age, some of which still survives. Here, for instance, is the politer original of Longfellow's "Joy, temperance, and repose, slam the door on the doctor's nose".

> "Si tibi deficiant medici, medici tibi fiant
> Hæc tria, mens hilaris, requies, moderata diæta."

The virtue of cleanliness is highly valued: "Si fore vis sanus, ablue sæpe manus," and nothing could be better than the advice: "Non bibe ni sitias, et non comedas saturatus".

Constantine the African, "Orientis et Occidentis Magister novusque effulgens Hippocrates," as his admiring biographer calls him, came to Salerno about 1075, bringing with him all the learning of the East; but he soon retired to the monastery of Monte Cassino, where he wrote medical works which still further increased his renown till they were found to be for the most part translations from Isaac Judæus and Haly Abbas, those parts only being omitted which might betray their Arabic origin. It is, however, not impossible that Constantine acted under pressure from his abbot, Desiderius, afterwards Pope Victor III., who may have preferred a slight sacrifice of truth to the scandal of permitting avowed translations from paynim writers to issue from his monastery.

Constantine's influence upon the school does not appear to have been great, for the Salernitans prided themselves on being the direct inheritors of the classical physicians, and refused to accept the Arabic doctrines even in a concealed form. But they adopted many of the new Eastern drugs, and the chief effect of Constantine's translations is seen in the great attention paid to materia medica during the twelfth century. The works of Nicholas Præpositus (1100) and Matthew Platearius (1140) formed the pharmacopœias of the middle

ages, and in the *Circa Instans* of the latter we find the first Latin descriptions of two interesting, though very different drugs, mercury and mumia. "Mercury (he declares) is hot and moist in the fourth degree, but some say it is cold in the fourth degree. It is used in ointments for scabies, pediculi capitis, and eruptions on the face; its fumes are highly injurious, and may cause paralysis and even death." "Mumia, according to Constantine, is hot and dry in the fourth degree. It is found in tombs, for the ancients preserved their dead with balsam and myrrh, as is still done by the heathens of Babylon. Mumia acts as an astringent in hæmorrhage and dysentery, and assists the healing of ulcers."

In his *Antidotarium*, Nicholas Præpositus quotes what he calls an ancient poem on weights and measures, which was probably the first thing the Salernitan medical student had to "get up," and which is so interesting from its partial correspondency with our modern weights, as well as such a brilliant example of "Leonine" verse, that I venture to give the original.

"Collige triticeis medicinæ pondera granis.
Grana quater quinque scrupuli pro pondere pone.
In drachmam scrupulus ter surgit multiplicatus.
Si solidum quæris, tres drachmas dimidiabis.
Hexagium solido differt in nomine solo.
Aureus hexagio solido quoque parificatur.
Constat sex solidis vel ter tribus uncia drachmis.
Uncia pars libræ duodena, quis ambigit inde?
Si quæris pondus quod habet sextarius unus,
Librarum quinque pondus debes mediare.
Cotyla sextario differt in nomine solo.
Continet heminas sextarius ut puto binas.
Obolus ut fertur semiscrupulus esse probatur.
Cetera mensuræ non sunt tibi nomina curæ;
Nam quia sunt ficta sordescunt suntque relicta.
Non eris illusus si tenes quod tenet usus."

Or, in shorter and more prosaic English, 20 grains 1 scruple, 3 scruples 1 drachm, 1½ drachms 1 solidus, hexagius,

or aureus, 9 drachms 1 ounce, 12 ounces 1 pound, 2½ pounds 1 sextarius or cotyla, half a cotyla 1 hemina, half a scruple 1 obol.

Commentaries on the Salernitan pharmacopœias were written by two French members of the school, Bernard of Provence, and Gilles (Ægidius) of Corbeil, afterwards physician to Philip Augustus, who both studied there towards the close of the twelfth century. The former gives us many curious glimpses of the beliefs and practices of the age. "Antimony with raw egg is good for cough. The Salernitan ladies fumigate themselves with antimony." "Coral.—If any one has palpitation at night, which often occurs after hot food, let him put a coral in his mouth, and he will be at once cured. This is why the Hospitallers and Templars carry a piece of coral in their belts." "Cubebs cure drunkenness, and prevent the breath smelling the next morning; never take more than five berries at once." "Cyclamen.—I, Magister Bernardus, of Provence, gave the juice of cyclamen to a friend with a quartan ague, and by God's grace he was cured." "Warmth is the principle of life. My master, Salernus, cured his squire (*armigerum*), who was nearly killed by a fall, by burying him in a dungheap up to his neck. He would also have recovered had he been put in the belly of a recently-killed animal, such as an ox or horse." "If a man is bitten by a mad dog, immediately put some of its hair on the bite, or make the dog, or some part of him, into a plaster."

Ægidius of Corbeil versified the Salernitan materia medica, and wrote two other poems on pulses and urines respectively, based upon the above-mentioned treatises of Theophilus Protospatharius. He tells us that he has chosen the poetic form because it favours brevity and prevents alteration by copyists, and the two poems certainly give a remarkably clear and condensed account of the Galenic and mediæval doctrine on those matters. The following is a brief abstract of his work on "the pulse," which he says may be considered from five points of view, and presents ten varieties:—

A. With regard to the motion of the artery.	1. small or large. 2. strong or weak. 3. quick or slow.
B. With regard to the substance of the artery.	4. hard or soft. 5. full or empty. 6. hot or cold.
C. With regard to the interval between the beats.	7. rare or frequent.
D. With regard to increase or decrease.	8. Pulsus incidens or decidens.
E. With regard to rhythm and regularity.	9. equal or unequal. 10. regular or irregular.

Most of these varieties occur in health as well as disease, and they then indicate the person's temperament: thus a large pulse shows a man prodigal, unstable, fond of praise, ambitious, open-hearted, and hot-spirited. A "cold" pulse is a sign of death; "wherefore (says a commentator) I do not advise the physician to stay with a patient when he finds such a pulse, for then cross and candles, ashes and shroud and holy water have their place". The goat-like or dicrotic pulse may be normal, but is most commonly found in continued fevers. The ant- and worm-like pulses (*p. formicans et vermiculosus*) are faithful heralds of death and smell of the sepulchre (*mortis præcones fidi redolentque sepulchrum*), except in cases of fainting, when they are commonly without danger.

When his subject permits it, Ægidius can write very fair verses, as, for instance, his lament over the sack of Salerno. In the year 1194 a terrible blow fell upon the Hippocratic city. The Emperor Henry VI. used the money obtained for the ransom of Richard Lion-heart to conquer South Italy, which he claimed in right of his wife. He bore a special grudge against Salerno, which was taken by storm, and delivered over to the untender mercies of a mediæval soldiery. The wives and daughters of the professors are said to have

been sold by public auction, and exile, captivity and the sword deprived the city of half its inhabitants. The decline thus begun was hastened in the next century by the establishment of rival schools at Naples and Palermo, and by the rise of the northern universities, and, except through the production of one or two distinguished surgeons, Salerno is no longer of any account in medical history.

NOTE.

The substance of this chapter is derived mainly from De Renzi, *Collectio Salernitana*, Naples, 1852, five vols.; Platearius, *Practica Circa Instans*, Venice, 1497, and Egidii Corboliensis, *Carmina Medica*, Leipsic, 1826. See also Daremberg, *L'Ecole de Salerne* in his *La Médecine Histoire et Doctrines*, Paris, 1865; Bécavin, *L'Ecole de Salerne et les Médecins Salernitains*, Paris, 1888.

XXXV.—THE LADIES OF SALERNO.

THE above is more courteous translation of *mulieres Salernitanæ*, a phrase of very frequent occurrence in the writings of the Salernitan masters, and usually introducing an account of some form of treatment employed either by the women of Salerno generally, or by particular ladies connected with the medical school, some of whom are mentioned by name. Magister Bernardus is especially fond of referring to "the ladies of Salerno," and it may be of one of them that he quotes, *apropos* of the virtues of the load-stone, the pretty line *Ut ferrum magnes, juvenes sic attrahit Agnes.* They were sometimes not above practical jokes. "The ladies of Salerno," says Bernard, "sprinkle roses with powdered euphorbium and give them to young men to smell, whereupon they instantly begin to sneeze." Here are some of his other references. "The Salernitan ladies, when they have long mourned for their dead friends, take a young pig's heart, stuff it with spices, and bake it in paste, then they eat it and at once forget their sorrow; but men do not eat ani-

mals' hearts, either because they cause forgetfulness, or because they are indigestible." "The *mulieres Salernitanæ* mix the root of spatula fœtida (fetid iris) with honey, and anoint their faces therewith to remove wrinkles." "They use aloes and rosewater for swellings on the face, but absinth is better than aloes." Magister Maurus observes: "The Salernitan ladies treat dropsy as follows: they go to the woods and collect plants indiscriminately, diuretic and others, maidenhair, hepatica, etc., etc. These they boil in salt water, and the patient first inhales the steam, then drinks, and finally bathes in it. While bathing they give him an electuary, such as —(here follows a long list)—or all these mixed together, and the juice of chick-pea (*cicer*). They repeat this five times, and they have cured many." Among other notices we may mention the following: "The Salernitan ladies steep bryony roots in honey and anoint their faces with it, which gives them a marvellous blush." "The ladies of Salerno give children poppy seeds in milk." "They make cakes of pellitory (*parietaria*), flour, and water, which are good for indigestion." "A certain lady of Salerno has proved that cyclamen juice is good for hæmorrhoids." "For dryness and roughness of the hair, mix bole armeniac with hot water and after washing the head pour this on it, then wash again with warm water; *sic operant mulieres Salernitanæ*." The other references deal chiefly with diseases of women, and all are medical, but in later times the Salernitan ladies seem to have adopted more general practice, and we find Bruno of Calabria closing his lament on the sad state of surgery in his days (thirteenth century) with the exclamation: "Not only amateurs (*idiotæ*) and laymen, but what is yet more horrible and indecent, vile and presumptuous females have now usurped and abuse our art".

When Rudolph the monk went to Salerno in 1059, he found, we are told, no one who could meet him in argument save "a certain learned matron," who is believed to have been Trota, or Trotula, the most famous of all the Salernitan ladies and the supposed authoress of a still existing treatise,

On Diseases of Women. The authenticity of this work is somewhat doubtful; but Trotula is frequently quoted by other Salernitans, and the following extracts show that she did not confine herself to gynæcology: "For toothache rub up rue and pepper, and put it in the tooth for one night, but if this is no good cauterise the tooth with a thin iron wire through a funnel, or put a little sugar in it". "For colic due to chill, or damp, or crudity of the humours, give hot water internally, and apply a sponge or cloth dipped in hot wine and slightly squeezed out externally." The treatise, *De Morbis Mulierum*, contains two excellent chapters on the management of the new-born baby and the choice of a nurse, which are, however, too long to quote, and ends with an important section on cosmetics. Here is a simple recipe. "To make the hair golden, take of elder bark, flowers of broom, yolk of egg, and saffron, equal parts; boil them in water; skim off what floats on the surface and use as pomade."

"A marvellous balsam. Take thrice distilled turpentine, lign-aloes, ambergris, and musk, equal parts, rub them up to a liquid ointment and distil nine times. Used on the face it will preserve youth, heal all wounds, marvellously clear the eyes, and preserve the body from all forms of putrefaction. "Et ego feci, et probavi, et est verissimum," adds the confident author, who, however, can hardly be Trotula, for the prescription indicates a date much later than 1059.

Trotula's fame in medicine extended beyond Italy, and lasted till the thirteenth century. The French poet, Rutebœuf, has preserved or imitated an oration by a travelling quack of that period. He is, he declares, no ordinary charlatan, but one of the special agents sent out by the famous Madame Trota of Salerno to catch strange beasts from which she manufactures her world-renowned ointments. Trotula is usually entitled the "Magistra" or "Mæstra"; the degree of "Doctor" was introduced later and was attained by another Salernitan lady, Constanza Calenda, A.D. 1430. Besides these we hear of Abella, Rebecca Guarna, and Mercuriada,

the last of whom wrote a treatise on surgery, which perhaps excited the wrath of Bruno of Calabria.

Some of the Salernitan ladies have become famous in general history. Sichelgaita, the duchess, whose amazonian feats at the side of her husband, Robert Guiscard, are known to readers of Scott and Gibbon, studied medicine at Salerno, her native town, and paid special attention to toxicology. She was naturally anxious that her own son, Roger, should obtain the birthright of his half-brother, Bohemund, and hearing that that famous crusader had gone to Salerno to recruit his health, she sent his medical attendant, one of her old teachers, a box containing a slow but effectual poison. The physician took the hint and administered the drug; but Duke Robert somehow became suspicious of what was going on, and calling for his Bible and his sword, he swore on the former that he would plunge the latter into his wife's heart on the day he heard of his son's death. Sichelgaita was equal to the occasion; she at once sent a trusty messenger to Salerno with a never-failing antidote, and "by the blessing of God, who had ordained Bohemund to be a scourge of the infidel," he recovered, but had for ever afterwards a remarkably pallid countenance. Some years later Sichelgaita succeeded in poisoning her husband and in making her son Roger his successor. For the credit of the duchess and the doctors it should be added that this story rests only on the evidence of a monk, Ordericus Vitalis, who wrote fifty years after the supposed events, and that its latter part is contradicted by other historians, who assert that Sichelgaita died before her husband.

The following is yet more tragic, and somewhat better authenticated. Stephania, who lived at the close of the tenth century, was "very skilful in Galenic matters," and though we are not told that she studied at Salerno, she can hardly have obtained such knowledge anywhere else. Her beauty was equal to her learning, and she married in early youth Crescentius, a noble Roman, who had conceived the ambition of reviving the ancient glories of the republic.

Unfortunately, the Emperor Otto III. resolved at the same time to make the eternal city the centre of the holy Roman empire, and Crescentius, deserted by the fickle populace, was besieged by overwhelming forces. In defiance of the terms of capitulation (if we may trust Italian writers) the head of the consul and patrician was stuck upon the walls of St. Angelo, and his beautiful wife submitted to the insults of the German soldiery. Her subsequent history has been compared to a Greek tragedy. "She ensnared the young emperor by her beauty, and slew him with a lingering poison." The chronicler, Landulph, tells the story at length. Otto lay sick at Paterno, and Stephania treated him for twelve days "with Hippocratic and Galenic remedies" so successfully that the ordinary attendants were dismissed, and only she and her maid allowed access to the patient. Then she proclaimed that he must be wrapped naked in the skin of a freshly-killed deer, a well-recognised mode of treatment, the vigour and supposed longevity of the animal being believed to pass over into the patient. The skin was procured, but Stephania smeared it with baleful and corrosive poisons, and, wrapped in this second Nessus shirt, the emperor perished in agonies, in the twenty-second year of his age, 23rd January, 1002. The story is repeated, with variations, by several reliable writers, but it is hard to believe that Stephania not only escaped punishment, but proceeded to attack the emperor's friend, Pope Gerbert (Sylvester II.). Neither his medicine nor his magic could save the supreme Pontiff from the vengeance of an injured woman, and he died, paralysed and speechless, within sixteen months of the emperor; but what may have been an attack of apoplectic aphasia was variously ascribed by mediæval writers to the poisons of Stephania, or to the more direct action of that evil spirit to whom, in exchange for Moslem wisdom, the young student of Cordova had, years before, bartered his soul.

The school of Salerno is probably most widely known through Longfellow's version of the "Golden Legend," the original of which dates from the twelfth century, and the

Salernitan ladies are mentioned in another romance of the same period. Marie de France relates in one of her "Lais" how a lover, before he could obtain his mistress, was required to carry her in his arms to the top of a hill. In vain does the lady starve herself to the uttermost; her weight is still such as would render the feat a dangerous one. Then she bethinks her of an aunt, who had studied the healing art for more than thirty years at Salerno, and who, therefore, has no difficulty in composing a strengthening medicine of marvellous potency. But the hero, unfortunately, refuses to use such aids, and the story ends tragically.

NOTE.

The quotations concerning the "ladies of Salerno" are from the *Collectio Salernitana*. Trotula's supposed work is also printed in the *Medici Omnes qui Latinis Litteris Scripserunt*. Rutebœuf, *Œuvres*, Paris, 1839. The chronicle of Ordericus Vitalis is translated in Bohn's series. Stephania's wrongs are recorded by Arnulph of Milan; her vengeance by Landulph, Leo of Ostia, Saxo, the writer of the life of Bishop Meinwerc, and other chroniclers, most of whom give different versions. Leo, who is perhaps the most reliable, says simply: "He died at Paterno poisoned (*potionatus*), as is said, by the wife of Crescentius, the senator, *qua impudice abutebatur*". The legend of the deer skin perhaps arose from the story that Crescentius had been dragged to execution on a cowhide. Most German writers reject the whole story (see Gregorovius, *Die Stadt Rom im Mittelalter*, vol. iii.), but, as Milman remarks (*Lat. Christ.*, v. 13), it seems as well evidenced as are most events of that age. Warnke, *Die Lais der Marie de France*, Halle, 1885, p. 113, "Les Dous Amanz".

XXXVI.—THE ARABO-SCHOLASTIC REVIVAL. (1) MEDICINE.

THE thirteenth century, like the age of Pericles and the Renaissance, is one of the great epochs of human history, and has been well characterised as "the trumpet call which summoned the middle ages into the modern world". Able and far-sighted politicians inaugurated important develop-

ments in Church and State, while theology, philosophy, and science were furthered by the labours of "great," "wonderful," "subtle," "universal," and "irrefragable" doctors. The impulse to this new activity, especially in science, was derived largely from the Arabs, and above all from the study of the physical and metaphysical works of Aristotle, which were translated first from the Arabic and afterwards from the Greek. Their effect was to revolutionise the dominant Christian view of Nature, hitherto looked upon as a ruin, beset with pitfalls and haunted by demons, into whose clutches the rash explorer of its mysteries was certain to fall, if he had not already made an unholy compact with their master, the prince of this world. This was now replaced, at least in part, by the Greek view of the universe as a harmonious whole, "the diapason closing full in man," who himself forms a little universe or microcosm.

An important agent and example of this change was Albertus Magnus, who was at once declared "blessed" by the Church, and a sorcerer by the general voice, and whose excessive praises—"great in magic, greater in philosophy, greatest in theology," "the Christian Aristotle," *major Platone, vix inferior Salomone*—were perhaps partly due to the fact that here at length was a man of science, approved by theologians, who might therefore be safely eulogised. But we must pass over the Blessed Albert, and even the "wonderful doctor," Roger Bacon, whose achievements may be considered, at least by his countrymen, more important than those of the "Doctor Magnus," and confine ourselves to physicians in the narrower sense of the word.

Two men stand out pre-eminent as types of the Arabo-scholastic medicine of the thirteenth century, and their work will here be sketched as briefly as possible. Three nations, and nearly twenty towns, have disputed the honour of producing Arnald of Villanova (1235-1312), but an impartial foreigner may believe that he was born in Spain, educated chiefly in France, and that one of the works attributed to him was probably written by an Italian, Arnold of Naples

or Novicomo. He tells us that he was doctor in the four faculties—theology, law, philosophy, and medicine, and he knew what were then the three learned languages—Arabic, Greek, and Hebrew. His theological works have perished in the flames, but we know that he attacked the friars with the vigour of a Wycliffe, and that his enemies convicted him of fourteen deadly errors—the most interesting being "that works of mercy and medicine are more acceptable to God than the sacrifice of the altar"—and called upon the Pope to deal with the heretic according to the customs of the Church. Clement V., however, though he took an active part in torturing Templars, and confiscating their goods, wisely considered that a physician, who was also an alchemist and possible gold-maker, might be put to better uses. He profited by his medical skill, and encouraged his chemical investigations, and the date of Arnald's decease is fixed by an encyclical letter, in which the Pope informs the bishops of Christendom of the death of that pious and learned physician, bids them search diligently for a certain medical work dedicated to himself, and threatens with his apostolic anathema any one who shall conceal or destroy it. But other Popes soon arose who knew not Arnald; thirteen of his works were publicly burnt, and even his commentary on the Salernitan, *Regimen Sanitatis*, was placed on the list of forbidden books.

Arnald was the alchemist of the new medicine, but his aim was not so much the transmutation of metals as the discovery of a universal remedy or elixir of life. He thought that some approach to this was made by the "alcohol" of the Arabs, the "aqua vini" or "vitæ," whose virtues, he says, were already known to many, and to which he attributed a special power of restoring youth to the aged. He further pointed out its remarkable property of extracting the essences of herbs and roots, and thus laid the foundation for the "tinctures" of our modern pharmacopœia. But while adopting the chemical innovations of the Arabs, he carried at the same time the best tradition of the Salernitan

school, its fondness for dietetics and hygiene. This is seen in the above-mentioned commentary, and in many of his aphorisms, such as, "The modest and wise physician will never hasten to pharmacy unless compelled by necessity". His treatises on various chronic disorders usually end with a chapter of general advice to those affected by them, which form the germ of the "consilia," so characteristic of the next epoch, and the following is a condensed abstract of his counsel to sufferers from palpitation (*tremor cordis*). After an excellent account of the causes, varieties, and medical treatment of the affection, he continues: "Whoever will be freed from this disorder let him carefully study and diligently observe this salutary teaching, lest he fall into a worse state. Let him avoid all coarse meats, such as that of oxen, goats, horses, camels, and water-fowl, rich fish, pastry, new or unleavened bread, old, moist, or salt cheese, etc.; in short, all that is indigestible and all excess. Let him also avoid impure air, and air too hot or cold, or strong winds, and, since we must always breathe, let him cool the air in the dog-days by sprinkling branches of willow, myrtle, or vine with cold water, and adorn his chamber therewith; also by the evaporation of camphor, rosewater, and other cooling odours; and in winter let him have a fire and use warm odours, myrrh, lign-aloes, laudanum (*ladanon*), calamint. Let him take moderate exercise before eating, and rest entirely after it, till the food has left the stomach, and then ride horses or gently trotting mules, avoiding rapid ascents or descents. Frequent combing of the hair is a great help, especially after sleep, for it assists the evaporation of the humours which ascend to the head. He may use scented baths in the usual manner. Let his sleep and waking be measured by Nature; he may sleep soon but not immediately after eating, and should lie first on the left side that the food may descend to the fundus of the stomach, and then on the right that it may pass on." Then follows a list of the things he may eat, in which we are astonished to find pickled pork, "sed licet raro". In winter and early spring he may eat twice a day, in summer

he should take three smaller meals, but must never eat until he has fully digested the last meal, for nothing is worse than to add indigestion to indigestion. Then he discusses the three forms of drink—wine, water and syrups—of which the first is a valuable medicine and food, but should always be taken with, and not before or after, other food; and finally, exhorts the patient to occupy his mind as much as possible with pleasant and cheerful thoughts.

The most interesting medical compendium of the age, the *Breviarium Practicæ*, is doubtfully ascribed to Arnald of Villanova. The writer calls himself Arnald (ii. 51). "A certain priest cured me of more than a hundred warts on my hands in this way: he made the sign of the Cross over the warts, and said: 'Go and you will soon be healed'. Then he went to a plant of pellitory (*parietaria*) and kneeling down repeated the Lord's Prayer; but where he should have said 'deliver us from evil' he substituted 'deliver Arnald from the warts on his hands'. Next he took three shoots of pellitory, repeating thereby three Paternosters in the same way, and buried them in a damp place. When they began to decay, the warts began to disappear, so that in ten days I was completely cured." He also mentions Montpellier (i. 36): "A man at Montpellier bled from his nose for three days and nights. I had done everything I thought useful with no effect, when a certain old woman (*quædam vetula*) dipped some rags in vinegar and put them round his neck, and on his forehead, and then gave him mint to smell and the bleeding ceased." The difficulty is that he speaks of Naples as his place of education, while the Spanish Arnald, so far as we know, did not visit Italy till middle-aged; and he is continually bringing in his "master," John Casamida, who is not mentioned elsewhere, *e.g.* (iv. 2): "My master ordered a pig to be hanged to the bed's head of a Neapolitan soldier who was lethargic; he perpetual clamour of the beast so terrified him that he ould not sleep. In another case he had the patient's head aved and anointed with honey; the flies so infested him at he had to keep continually striking at them and so was

cured of his lethargy." "Cases of apoplexy should not be buried for sixty hours; for if buried at once, as certain 'idiotæ' recommend, they may come to life in their coffins (here he gives some horrible instances). Doubtful cases should be treated as my master treated a friend of mine who was already in the hands of the priests. He went to the grave, bade the priests be silent, and put a little carded silk on his face, and a full glass of water on his heart; the silk moved, and a little of the water overflowed. So, seeing that he lived, he at once had his head shaved and applied a plaster of castoreum and mustard in strong vinegar, ordered his limbs to be tightly ligatured at the shoulder and hip joints where the glands are, put castoreum under his tongue, and had his hands and feet rubbed with salt and nitre. Meanwhile he bled him from both saphena veins, from the vein at the side of the nose, and finally from the basilic and left salvatella veins. Then he put something in his nose to make him sneeze, and after an hour the patient began to sit up in a stupid way, and was saved. He perfectly recovered, and my master gained therefrom great praise and honour, and a multitude of friends, and it was said of him that he had raised the dead" (i. 14). Here are two more extracts from the work, which is not without originality: "To drive away mice from houses, use this fumigation. Take realgar, salt, pomegranate bark, hellebore root, sulphur, litharge, and shells of sea locusts (shrimps?) equal parts, rub together and sprinkle on hot coals through the house. All mice will flee, and will never come back. But do you also avoid that fume, for it is horrible exceedingly." The third book begins thus: "In this book I propose, with God's help, to consider diseases peculiar to women, and since women are, for the most part, poisonous creatures, I shall then proceed to treat of the bites of venomous beasts".

As Arnald is the first great representative of the school of Montpellier, so Peter of Abano (1250-1315) is the earliest ornament of the University of Padua, afterwards so fertile in great physicians. Like Arnald, he came into collision with

the theologians, and was only saved, by an opportune death, from being burnt alive. For his heresies were worse than those of his Spanish colleague; his astrological theories seemed to leave no room for the action of free-will or Providence; he denied the existence of the devil, and he dared to suggest that the case of a patient who lay in a trance three days might help to explain some Christian miracles, including even the raising of Lazarus. "But he lied in his iniquity," says Thomas, general of the Augustinians, "and received the reward of his error, for I was present when his bones were burnt in the city of Padua for these and his other heresies." A later writer asserts that his body was concealed by his housekeeper, Marietta, so they could only burn him in effigy; but which is correct matters little either to him or to us. The sentence of condemnation was publicly read, his memory was devoted to eternal infamy, and his wealth, which was great, to the use of the Church.

Peter of Abano represents the scholastic side of the new medicine, with its love of subtle distinctions and wordy dialectics, and he gained the title of "Conciliator" from his great work, *Conciliator Differentiarum*, intended to reconcile the doctrines of physicians and philosophers. In it he discusses many curious and some important questions—whether fire is hot; whether pain is felt as pain; whether the head was meant for the brain or the eyes; should we sleep on the right or left side? How often should we eat in the day? A healthy man, says Peter, may thrive on one meal, but two are better, or an agreeable variety may be got by eating three times in two days. Women, children, or feeble persons may take three or even four meals daily. Is wine good for children? Certainly not! The discussion of the question whether mercury is a "hot" or "cold" medicine contains the nearest approach to a clinical history I can find in his works: "An apothecary delirious with fever, and raging with thirst, got out of bed, went down to his shop, and drank a jar full of mercury in mistake for water. Then he went back and died. His relations, finding a lot of mercury

in his bed, sent for the physicians to explain the miracle. On examination they found about a pound of mercury in his stomach, and the blood in his heart firmly coagulated, evidently through the coldness of the metal. Mercury is therefore 'cold' in the fourth degree." But Peter was no less famous as a practitioner than as a disputant, and, in spite of his high fees, was in great request at Padua. As an example of this practical side, we may take his directions for the treatment of stomach-ache (*de dolore stomachi*). Narcotics, he says, should not be used except in the severest cases as a lesser evil, for they only produce an apparent cure. The indications are: "(1) To invoke the Giver of salvation, of the abundance of His mercy, to grant health to the sufferer, and to add to these prayers medicines endowed with Divine virtues, and the rules of life I have laid down in my treatise on migraine; (2) to immediately meet any vehement or serious symptoms; (3) to soothe the stomach and strengthen its digestive power; (4) to get rid of the *materia lædens;* (5) to treat any other organ which may be involved, and to be especially suspicious of the liver". He then pauses to ask, "What is pain?" and finally concludes that it is *rei contrariæ contrarietatem sentire*. Food and drink should be avoided altogether, or should be of the lightest kind. Their nature he leaves to the physician, who must consider the patient's temperament, and which humour is in excess. Vomiting is not to be treated unless very severe, for it is a natural cure, and the stomach's shape and position have been specially ordained to enable it to get rid of excessive or injurious food in this way. If the pain continues, a warm bath may be given, and the patient should take warm aromatic wine with a little rosewater. Warmth, he declares, always tends to lessen pain, and proceeds to discuss the reasons. Finally comes the usual long list of drugs, the action of which he attempts to explain, but adds: "The drugs which cure this disease will increase the virulence of another very like it; men also are diverse, and subject to diverse operation of the same medicine. Who is sufficient for all these things? Pray, therefore, that God,

the Giver of health, will direct you to the choice of the proper remedies."

In case the physician should be still doubtful, Peter adds a prescription of his own "whose virtue and noble experience is excelled by none, and which will cure all gastric affections, *si Deus voluerit.* Take mastich, lign-aloes, myrrh, cinnamon, of each 5 drachms, cassia, cloves, spikenard, each 3 drachms, euphrasy half an oz., white and red coral each 1 oz., sugar a sufficiency."

We must not suppose that the relations of medicine to the Church were so strained as might appear from the biographies of Arnald and Peter; on the contrary, the two were intimately connected, and the thirteenth century, as indicated above, is marked by at least a partial truce between theology and science. In the next chapter we shall see that a surgeon became a bishop, and we may here relate how a physician, as was meet, attained yet higher dignity, the highest, indeed, on earth, that of supreme head of the visible Church. Peter of Lisbon, called Petrus Hispanus, was the son of a physician, from whom, and probably from the neighbouring Arabs, he learnt the rudiments of the medical art. He completed his education at Paris and Montpellier, where he became, in the curious language of a contemporary, "a general clerk, especially in medicine". He then took holy orders, but continued to practise the art of healing, and succeeded so well in both professions that by about his fiftieth year he had acquired the office of physician to Pope Gregory X. and the rank of Cardinal Bishop of Tusculum, 1276. That year is unique in the annals of the papacy. Three supreme Pontiffs died within seven months, causing so much disorder in the papal household, and ecclesiastical affairs generally, that the Church loudly demanded the election of a reasonably young and healthy head. It was known that the Bishop of Tusculum was a skilful physician, and that he had often prophesied for himself a long life, so he was chosen, and assumed the title of John XX. (the XXI. of later historians). But he lived only seven months, for,

says Bishop Ptolemy of Lucca, "he was admiring himself alone in his chamber, when the roof fell upon him and crushed him that he died, a warning to all who are puffed up by their state and dignity". Other historians relate that he was abusing the monks "whom he little loved," or dictating a heretical book when this judgment fell upon him, "and as he was miserably dying for five days he kept repeating: 'What will become of my book? Who will finish my book?' or words to that effect." The Dominican chronicle of Colmar dismisses him with brief severity: "John the Pope, a magician skilled in all the sciences, an enemy to men of religion, a despiser of the decrees of the General Council, died this year 1277".

Pope John is the probable author of the most popular of mediæval receipt books, the *Thesaurus Pauperum*, or treasury of the poor. In the preface he says that he has collected all the works of the ancient physicians he could procure, and has carefully extracted whatever seemed valuable; but he wisely adds: "I exhort and advise the reader of this book not to apply himself to the cure of the sick, till he has considered the nature of their diseases, and their constitutions. And let him also study diligently to learn the properties of things, their substance, complexions, and hidden powers and virtues; otherwise he will be like a blind man thrusting the blind patient into the ditch of death." Then follow a great number of prescriptions from various writers down to his contemporary Gilbert the Englishman: "For toothache drop juice of ground ivy into the ear on the same side; it will cause some pain, but will soon cure the disease, as say Avicenna and others who have tried it". "Gilbert's ointment for gout: Take a very fat puppy and skin him, then take juice of wild cucumber, rue, pellitory, ivy berries, juniper berries, euphorbium, castoreum, fat of vulture, goose, fox and bear, equal parts, and stuff the puppy therewith. Then boil him: add wax to the grease that floats on the surface and make an ointment. Or, if you like, take a frog when neither sun nor moon is shining; cut off its hind-legs

and wrap them in deer skin; apply the right to the right and the left to the left foot of the gouty person, and without doubt he will be healed." This is how the author treated hysterical females: "I can say from experience that if a large cupping glass (a common jar will do) be applied to the lower part of the patient's abdomen, with free use of the actual cautery, it will most thoroughly cure this disease. In hysterical fainting blow pepper and salt up the patient's nose. She will soon come round." "To cure scabies in one day take of liquid pitch three oz., sulphur, nitre, frankincense, each one oz., oil a sufficiency; rub together and make an ointment."

NOTE.

Arnaldus de Villanova, *Opera Omnia*, Lyons, 1532. Much light has recently been thrown on Arnald's biography by Pelayo, *Los Heterodoxos Espanoles*, three vols., Madrid, 1880. In April, 1285, Pedro III. of Aragon gave him an estate near Tarragona, "on account of the many services which we have received and hope to receive from you, our beloved physician, Magister A. de V.". The king died in the following November, and Arnald was one of the witnesses to his will. In 1300 we find him at Rome appealing to Pope Boniface VIII. for protection against his enemies, in a letter signed "Arnaldus de Villanova, magister in medicina, Christi servus indignus et inutilis, fidelissimus ipsius Bonifacii medicus," etc. The Pope told him to leave theology and stick to medicine, "Intromitte te de medicina, et non de theologia, et honorabimus te," but Arnald heard a voice from heaven telling him to sit down and write quickly how that Antichrist would soon come, and would recruit his followers, not from the Saracens, but from the hypocritical friars; so he had to flee from Rome. He returned, however, under Clement V. and was in high favour at the papal court, being described in a letter from a cardinal as "prudens, et sapiens, et Spiritu Dei fervens, magister Arnaldus de Villanova, vir luminis et virtutis". His contemporaries believed he could make gold; thus Juan Andres, a jurist, writes: "Plus nostris diebus habimus magistrum A. de V. in curia Romana, qui etiam magnus Alchemista, virgulas auri quas faciebat consentiebat omni probatione submittere".

Peter de Abano, *Conciliator, etc.*, Venice, 1521. The passage on stomach-ache is from his continuation of Mesuë (the Younger), *De Morbis Internis*, Lyons, 1557. His biography (fullest by Mazzuchelli, *Notizie intorno alla Vita di Pietro d'Abano*, Venice, 1750) is mostly

legendary, there being little contemporary evidence about him beyond the quotation given above from Thomas d'Argentina, *Commentaria in iv. sententias Petri Lombardi*, iii. 38, 4. The Prior General is discussing the curious question: What is to be done if a woman's husband is miraculously restored to life after she has married again? Some profane persons have doubted the possibility of this, and he then introduces the Paduan physician and his heresies.

John XXI., Pope, *Thesaurus Pauperum*, Frankfort, 1576. The life of Pope John is given by Bishop Ptolemy of Lucca in Muratori, *Rerum Italicarum Scriptores*, xi. The *Thesaurus* has also been attributed to the Pope's father, Julian Rebello, to Arnald of Villanova, Albertus Magnus, and Gilbert the Englishman himself; but there seems no good reason to doubt the usual tradition, supported as it is by the evidence of a contemporary prelate, who may surely be expected to tell the truth of a Pope whom he had probably seen, and possibly conversed with.

XXXVII.—THE ARABO-SCHOLASTIC REVIVAL. (2) SURGERY.

GUY OF CHAULIAC, "restorer of surgery," gives us in the preface to his chief work a brief estimate of his immediate predecessors in that art. Till the time of Avicenna physic and surgery were, he says, united, but since then they became separate, and the latter degenerated into the hands of mechanics. "The earliest of these were Roger, Roland, and the 'four masters,' who wrote special books on surgery, in which they mixed up much empiricism. Later came Bruno, who combined cleverly enough the theories of Galen and Avicenna with the practice of Albucasis, but he had no complete translation of Galen, and he has entirely omitted anatomy. Then came Theodoric, who compiled a book by stealing everything Bruno had said, with some fables of his master, Hugh of Lucca. William of Saliceto was a man of ability (*valens homo*); he composed two epitomes of physic and surgery, and in my opinion treated those subjects very tolerably, so far as he went. Lanfranc also wrote a book containing little else than what he got from William, but he

changed the order. At the same time, Magister Arnaldus of Villanova flourished in both faculties, and wrote many excellent works." He afterwards divides them into three sects, according to their mode of treating wounds. (1) Roger, Roland, and the "four masters" treated all wounds and inflammations with poultices; (2) Bruno and Theodoric used wine only and dry dressings; while (3) William of Saliceto and Lanfranc, wishing to mediate between the two, cured all wounds with ointments and sedative plasters. To these he adds two other sects, (4) Germans, soldiers, and those who follow the wars, who use incantations, potions, oil, wool, and cabbage leaves (referring, perhaps, to the Hospitallers and Teutonic knights); (5) women, and many ignorant persons, "idiotæ," who send patients to the saints only in all diseases.

Guy's criticisms are, perhaps, sometimes too severe, especially in the case of Lanfranc, and his divisions are rather too arbitrary, for all the above-mentioned surgeons used ointments, though those of the Salernitan school direct them to be put round not on the wound, "for Constantine declares that fatty substances are not good for wounds".

The fathers of Italian and indirectly of European surgery were Roger of Parma and Hugh of Lucca, of whom the former is known as a writer and the latter as a practitioner only. Roger studied and taught at Salerno, and his work, the *Rogerina* (1186), which was edited by his pupil, Roland, and commented upon by the mysterious "four masters," long formed the Salernitan text-book of surgery. Of special interest is his recommendation of the ashes of sponge and sea-weed, which would, of course, contain iodides, for goitre, and the commentary of the "four masters" contains one of the earliest examples of a "post mortem". Speaking of the difficulties in treating head injuries, they relate: "A young man was struck on the head with a stone from a sling; he presented no symptoms, but the next day he was found dead, and, on opening the skull, a large blood clot was seen on the surface of the dura mater".

Hugh of Lucca belonged to the noble family of Bourgognone, one of whom was prætor or podesta of Bologna in 1214, when Hugh was appointed city surgeon. The agreement still exists in which he binds himself, for a single payment of 600 lire, to reside during half the year in the city, to attend the poor gratis, and to accompany military expeditions, besides which he was afterwards required to give evidence in medico-legal matters. His name is honourably connected with the early history of anæsthetics, which may be briefly sketched here. It is often asserted, and it is not impossible, that the ancient surgeons sometimes produced insensibility by means of hypnotism; but there is no direct evidence on the subject. They appear, however, to have sometimes obtained a local and partial anæsthesia by the application of a "lapis memphiticus," perhaps a kind of bitumen, which acted through the phenol it contained, and they certainly used decoctions of poppy and mandragora, as did also the mediæval operators. Bernard tells us that the Salernitans rubbed up poppy seed and henbane, and used them as a plaster to deaden the sensibility of a part to be cauterised. The author of the *Breviarium* (Arnald of Villanova?) gives the following recipe: "To produce sleep so profound that the patient may be cut and will feel nothing, as though he were dead. It is an 'experimentum' of Magister Michael Scot. Take of opium, mandragora bark, and henbane root equal parts, pound them together, and mix with water. When you want to sew or cut a man dip a rag in this and put it to his forehead and nostrils. He will soon sleep so deeply that you may do what you will. To wake him up, dip the rag in strong vinegar. The same is excellent in brain fever, when the patient cannot sleep, for if he do not sleep he will die." Hugh of Lucca's method was either the original or an improved version of this. He added the juice of lettuce, ivy, mulberry, sorrel, and hemlock to the above, and boiled the whole with a new sponge. This was then dried, and, when wanted, dipped in hot water and applied to the patient's nostrils.

What we know of the practice of Hugh of Lucca is gathered from the writings of his son Theodoric, Bishop of Cervia, and surgeon and "pœnitentiarius" to Pope Innocent IV. He is remarkably fond of mercurial ointments, especially an "unguentum saracenicum". Besides parasitic skin affections, this is, he says, the best remedy for the "malum mortuum," a disease characterised by chronic ulcers on the arms and legs, and for some forms of rheumatism, while it will even cure leprosy in the early stage. The patient should stand between two fires and rub his arms and legs daily with the ointment till he produces toothache and salivation.

Theodoric's simple method of treating wounds by wine and dry dressings, in opposition to most earlier surgeons, who held that suppuration should always be encouraged in order to "purify" the part from morbid humours, was a great advance. But this he borrowed from Bruno, though some of his other suggestions seem more original. "Head injuries are nearly always fatal, when the brain is involved, but the patient will have the best chance of recovery if the surgeon applies a simple ointment, and sprinkles thereupon the 'pulvis mirabilis' of Hugh of Lucca, in the form of a cross, repeating at the same time the following verses: 'In the name, etc.; in the name of the holy and undivided Trinity. The right hand of the Lord hath the pre-eminence, etc. God hath chastened and corrected me, etc. I shall not die, but live, etc.'" "To extract arrows from the body repeat three Paternosters; then take the arrow between the joined hands, and say, 'Nicodemus drew out the nails from the hands and feet of the Lord,' and it will at once come out." The bishop admits that he has never tried this himself, but he has been assured of its efficacy by many reliable persons.

But the greatest surgeons of the second half of the thirteenth century were William of Saliceto and his pupil Lanfranc of Milan, both of whom frequently give their own experience, as well as that of their predecessors. We may accept Guy's estimate of the former, and space only permits two brief extracts from his surgical and medical work

respectively: "In a certain army in which I served—and I was very young then—I saw a soldier of Bergamo struck by a great arrow from a machine. The arrow went in on the right side of his neck near the vessels, but without injuring them, and came out over his left shoulder. I extracted it in the way described in the chapter on 'Arrow Wounds of the Head,' and treated the wound in the manner often related. The man got perfectly well, and lived long after, and I got a good fee."

Though Saliceto is usually classed among the surgeons, his medical treatise is four times as long as his work on surgery. It was written "at the earnest request of Ruffinus, prior of the Convent of St. Ambrose at Placentia, and of his fellow-monks; also for love of my son, called Leonardinus, whom I am bringing up to the profession of medicine". The most interesting chapter is that on "Hardness of the Kidneys" (*Durities renum.*, i. 140). "This disease either begins insidiously after an inflammation, or comes of itself. Signs: Decrease of urine, heaviness and slight pain in the region of the spine and kidneys, followed by dropsy. Treatment (various poultices and inunctions, the composition of which need not detain us): Let him drink twice daily before dinner and supper oxymel and barley-water, or decoction of mallow seeds with honey, which is better. He should take as a purge once a week a decoction of rhubarb, etc. His diet should be regulated as in the chapter on inflammation of the kidneys (*i.e.*, chiefly milk flavoured with honey or sugar, with rice and oatmeal cooked in milk of almonds or goat's milk)."

It was Lanfranc who introduced the Italian surgery into France, and Guy's decidedly unfair estimate of him is, perhaps, a return for his criticisms of the French surgeons, who, he declares, were mostly "idiotæ," and utterly ignorant, not even knowing the distinction of the actual and potential cautery. He was, however, delighted with Paris, the earthly paradise, the city *sine pari*, and he was received with honour by the medical faculty, and by the Surgical College of St. Côme, of which he became a member A.D. 1295.

It was partly to show his gratitude for this welcome that he wrote his *Ars Completa Totius Chirurgiæ*, as is shown by the following extract from the preface, which also indicates the readiness with which he imparted his knowledge by clinical instruction: "Wherefore to the honour of God, of the most blessed and glorious Virgin, of the blessed confessor Ambrose and all the saints; out of the respect to Philip, the most potent and most Christian king; out of love to thee, dearest Bernard; urged by the prayers and precepts of the venerable masters of physic, and from fraternal affection to the intelligent students of medicine, who do me the honour of accompanying me, I attempt this great work for the common use, and especially for my son". Among the many things which attract our notice in this work his remarks on the treatment of hæmorrhage are perhaps the most interesting. Pressure is the first and best method. A child three years old fell down with a knife in its hand, and cut a vein in its neck. Lanfranc saved its life by holding his finger for more than an hour on the bleeding spot, while his assistant went to fetch a styptic application consisting of frankincense, aloes, white of egg and hare's fur. But he is acquainted with ligature and even torsion: "A boy at Milan, fifteen years old, was stabbed in the arm by another boy. The bleeding could not be stopped by the ordinary methods, so I judged it necessary to dissect out the vessel and tie it. The boy's mother, however, sent for a certain 'laicus,' who utterly reprobated my opinion, and promised to cure the patient. He stayed, and I departed; but the bleeding continued off and on till the patient was nearly dead. I was sent for but declined to go. Then a physician acquainted with the parents' friends rebuked them and the boy's mother for rejecting my advice for that of the 'idiota,' and told them it was the only way to save his life. A surgeon was asked if he could perform what I had recommended, and replied he could, so he incised the skin over the vessel, 'et illam contorsit in manibus, et ligavit cum filo'."

The link between Italian and French surgery is formed by Henry of Mondeville (or Hermondeville), the pupil of

Lanfranc and tutor of Guy of Chauliac. "Henry of Hermondeville (says the latter) began a very notable treatise in which he strove to make a marriage between Theodoric and Lanfranc, but his death prevented its completion," which was, perhaps, the reason that it remained unprinted till 1892, when it was published by Dr. Pagel of Berlin.

The treatise is notable in many respects, especially from the light it throws upon professional habits and customs, but we must confine ourselves for the present to a few short extracts: "It is very dangerous for a surgeon, who is not of repute, to operate in any way different to that in common use; as did Master J. Pitard and I, who first introduced Theodoric's method of dressing wounds into France, using it at Paris and in many military expeditions. And we were opposed by all, especially by the physicians, and suffered much abuse and many threats from the vulgar and our own colleagues, so that we should have given it up entirely, God knows, had not his serene highness Charles, Count of Valois, aided us, and others who had seen our cures performed in the armies; and the truth also aided us, for whose sake it is better to die than to adhere to a falsehood, for is not God the truth itself, and did not He die for it? But had we not been strong in the faith, and men of repute with the king and the princes, and some little learned (*aliquantulum literati*), we should have had to have given up that method." In questions of diagnosis the effect of any drugs the patient may have been taking must be considered: "If we find ardor urinæ followed by difficulty of micturition, we know that these occur after the application of cantharides; similarly, if a person who has used ointment for some infectious disorders (*propter aliquas infectiones*) gets inflammation of the mouth and corrosion of the gums, we at once judge that it is due to mercury". It is the surgeon's duty to keep up his patient's spirits in every possible way, and he recommends that a musician (*joculator*) should be brought in "who may solace him by playing on a viol, or ten-stringed psaltery". "Or false letters may be written relating the decease of his enemies, or those

from whose death he expects advantage; if, for example, he is canon of one or more churches, he should be told that the bishop is dead and he is elected. His dreams, also, should be favourably interpreted, as in the case of a man who was canon of four prebends, and who dreamt two staves were brought him. Next day he told this to his comrades while riding, and one said: 'Sir, you are canon of this and that, your bishops are dead, and it is impossible but that at least two pastoral staves will be brought you'. Then he rode faster in his joy, with a loose rein, and his horse fell, and he brake both his legs, and walked ever after with those staves he had dreamt of." "When you are treating a wound or accident the friends, etc., should be excluded, for they may faint and cause a disturbance; but sometimes a higher fee may be got from persons present fainting and breaking their heads against wood and the like than from the principal patient." Henry has always a keen eye for the fee: "Never dine with a patient who has not paid you; it will be cheaper to get your dinner at an inn, for such feasts are usually deducted from the surgeon's fee". "I have never found any one so rich, or even so honest, of any condition, religious or other, who was ready to pay what he had promised, unless obliged and convicted." The case, however, was not so bad after all: "You surgeons, who serve the rich faithfully for good payment, and tend the poor for charity, need not fear fire, wind, or rain, nor need you enter a monastery, or wander about the world for a living; for by your art you may save your souls, and live in comfort and die in peace in your own homes. Rejoice, therefore, for great is your reward in heaven, as necessarily follows from the word of the Lord by the prophet in the psalm, Blessed is the man that considereth the sick and needy, the Lord shall deliver him in the time of trouble."

NOTE.

The surgical works of Roger, Roland, Bruno, Theodoric, Saliceto, and Lanfranc are printed with those of Guy of Chauliac, Guido de

Cauliaco, *Ars Chirurgica*, Venice, 1546. The commentary of the "four masters" may be found in the *Collectio Salernitana*. A mediæval English version of Lanfranc's surgery will shortly be published by the Early English Text Society. Guy's severe judgment upon him has been partly atoned for by Malgaigne, who says that Lanfranc's chapter on head injuries is the ablest mediæval treatise on the subject. Guy himself admits that the French surgeons were so ignorant that when the king's daughter dislocated her shoulder, the court practitioners all failed to diagnose it, and thought it was an inflammation. Gulielmus de Saliceto, *Liber in Scientia Medicinali*, Venice, 1489. *Die Chirugie des Heinrich von Mondeville*, by Dr. J. L. Pagel, Berlin, 1892. The J. Pitard here mentioned was surgeon to St. Louis, whom he accompanied on his crusade. He was also founder of the College of St. Côme (Cosmas), but, like Hugh of Lucca, he wrote nothing himself, and is known only through the works of his contemporaries.

XXXVIII.—THE CLOSE OF THE MIDDLE AGES.

THE interval between the end of the thirteenth century and the beginning of the Renaissance (1300-1450) is marked by many signs of the approaching dawn, but we must here confine ourselves to the work of Mondino of Bologna, "restorer of anatomy," Guy of Chauliac, "restorer of surgery," and the chief writers of those "consilia," or consultations, which form the characteristic medical literature of the period.

In contrast to the ancient Greeks, the early Christians looked upon their living bodies with contempt, but they regarded them after death with even more than Greek reverence, for was not every particle destined to be raised in glory? Human anatomy was, therefore, out of the question, and even the dissection of animals might bring upon the surgeon an accusation of sorcery, or of attempting to restore the pagan arts of divination. We have seen, however, that the students of Salerno studied the anatomy of the pig as early as the eleventh century, and in the thirteenth the Emperor Frederick II. ordered that a human body should be dissected at least once in five years. Some scanty knowledge

might also be obtained from another source contrasting strangely with those now employed. During the Crusades princes and nobles were wont to take with them, as part of their camp furniture, a large cauldron, in which, in case of death, their bodies were boiled, and the bones extracted and brought back to their fatherland. So was it done to many bishops and knights who accompanied Frederick Barbarossa to Italy in 1167, and to that emperor himself when he was drowned in the river Saleph. St. Louis, of France, Philip the Bold, and his queen, were treated in the same way till, in A.D. 1300, the practice was entirely prohibited by a bull of Pope Boniface VIII.. As already indicated, *post-mortem* examinations were by no means unknown in the thirteenth century, and human anatomy was probably studied more frequently than is generally supposed. It was certainly practised by Peter of Abano, and Peter of Abano was a friend of Mundinus or Mondino de Luzzi. The latter became professor at Bologna about 1290, and in 1316 he published his *Anatomia*, the first work since the days of the Alexandrine anatomists founded on actual dissection of human subjects, in which he is said to have been assisted by a learned lady, Alexandra Giliani.

Bologna now became the foremost of medical schools, and among the students attracted thither by the fame of Mondino and his pupils was Guy of Chauliac, who also studied at Montpellier and Paris, and afterwards became surgeon and "caplanus commensalis" to three Popes, Clement VI., Innocent VI., and Urban V. (1352-78). Guy holds the same position in surgery as Mondino does in anatomy, both are said to have "restored" their respective arts, that is their works possessed sufficient originality and excellence to take the place of translations from Galen and Albucasis, but the creation of a new anatomy and a new surgery was reserved for their greater successors, Vesalius and Ambrose Paré.

Guy of Chauliac was not only the ablest practitioner, but also the most cultured surgeon of his age. He reverences the Greeks and Arabs, especially "our father Galen," and

the great Albucasis, and he admits that his work on surgery is mainly compiled from their writings, "with the addition of a few things which, according to my moderate intelligence, seemed to be useful. For we are like children on the neck of a giant, who see all the giant sees and something besides." His contemporaries, he says, "follow one another like cranes, and despise everything not sanctioned by custom and authority, forgetting that Aristotle declares, in the second book of his metaphysics, that these are the two great hindrances to the discovery of truth". But most of them know nothing of Aristotle, and both surgeons and physicians so neglect their general education, that, if they persist in doing so, he will not be surprised to see tanners and carpenters deserting their trades and taking to physic. A good surgeon should be acquainted with liberal studies, with medicine, and, above all, with anatomy; "he should be courteous and condescending, bold in security, cautious in time of danger, avoiding impracticabilities, compassionate to the infirm, benevolent to his associates, circumspect in prognosis, chaste, sober, pious and merciful, not greedy of gain, no extortioner, but looking for his fee in moderation, according to the extent of his services, the ability of his patient, the result of his treatment, and a proper sense of his own dignity". The surgeons of the preceding century had been little more than wound curers, and, as we have seen, were divided into sects according to their various modes of dealing with such injuries; but in Guy's work other branches of the art, and especially the treatment of fractures and dislocations, which was comprised under the curious term "Algebra," first became prominent, and we find many practices recommended which are generally supposed to have been of much later origin. Thus, he advises that bandages should be stiffened by being dipped in white of egg; he suspends fractured limbs in a sort of cradle, "cunabulum aut suspensorium"; and he treats fractures of the thigh not only by long splints, but also by the pulley and weight, "ad pedem ligo pondus plumbi transeundo chordam super parvam polegeam". One of the most striking objects

of the hospital ward seems to have originated with him, for he recommends that a rope should be suspended over the patient's bed to assist him in lifting or turning himself.

The following was Guy's mode of treating chronic ulcers: "Wash the ulcer and the parts round it with alum water; then apply a thin sheet of lead of the size of the ulcer, and bandage firmly. It works wonders in all ulcers and cancerous dispositions, and how often I have gained honour thereby He knows who knoweth all things."

The philosopher Seneca notices with just censure a custom among the physicians of his day of writing letters of advice to patients they had never seen. The habit is not yet extinct, but it formed only one, and that the least important, source of the medical "consilia" of the fourteenth and fifteenth centuries. Others consist of extracts from the case books of distinguished physicians, published for the benefit of their colleagues and successors, while a third class comprises answers to inquiries sent by country practitioners or former pupils to celebrated professors, who thus became the prototypes of the modern consultant. The "consilia" are far superior in interest and originality to the old compilations, and mark an important step towards the reproduction of the clinical observations of Hippocrates. The chief writers were Italians: Gentilis of Foligno (died of the "black death" 1348), Antony Cermisone (died 1443), and Bartholomew Montagnana († 1470), all three professors at Padua, but we must confine ourselves to one or two examples from the first and last named authors. A typical "consilium" begins with a brief description of the patient, his temperament, and his disease; it then suggests what may be the causes of this, and warns him of the dangers he incurs if he does not follow the advice given under the heads of regimen, diet, and drugs respectively.

Gentilis lays by far the greatest stress on the last. Here is his "consilium" "for one gone mad through excess of joy. (1) Make a syrup of decoction of borage, bugloss, endive, dodder and senna leaves in sugar and water. Dose 2 to 3 oz.

in a little warm water; (2) a similar decoction with the addition of poppy-heads to be taken at bed-time; (3) an embrocation for the head composed of violets, aloes, poppy-heads and seeds, lettuce leaves, camomile, and nenuphar, boiled in barley-water; (4) numerous cupping glasses should be applied to his neck, shoulders, and buttocks; (5) it will be of great advantage if you can produce hæmorrhoids; (6) make a julep of borage and bugloss, of which let him drink frequently." The following is the shortest of the 305 "consilia" of Bartholomew Montagnana: "A lady with an ulcer in her ear, discharge of pus, noises, and decrease of hearing. There is great fear that this will result in complete deafness, which may be prevented thus: Let her avoid over-eating, and refrain from pastry, milk, and all milk foods, from boiled fish, especially tench and eels, and from vegetables and stewed meats, above all at night. She must avoid sweet wines, and must add one-fourth water to what she does drink, refrain from active exercise after food, and must not hang her head down. As to medical treatment: (1) Let her be bled to four or five ounces from the right cephalic vein, or that between the thumb and index of the right hand; (2) a rhubarb pill in the morning; (3) a poultice, chiefly of powdered asarum root, to be applied locally for about half an hour daily; (4) an oil, two or three drops of which are to be run into the ear four times a day; (5) another purgative pill at bed-time; (6) some drops of cyclamen juice to be used for ten days alternately with the above oil. By so continuing the patient will be cured *ad laudem Dei Omnipotentis*. Amen."

Another "consilium" is addressed to an English abbot, who proposes to go on a pilgrimage to Jerusalem. The first thing he will have to fear, says Bartholomew, is sea sickness, and he recommends as a preventive confection of quinces with coriander to be taken after meals. If this fails and sickness comes on, he should tie bandages tightly above his knees and elbows, and put a large cupping glass "in medio stomachi" but without scarification. He may further use a suppository containing scammony and colocynth, the action of which

may be hastened by plunging his feet suddenly in cold water. After this let him anoint his belly with one of the following ointments (a long list of ingredients including quince and coriander, in which he seems to have great faith). Then comes a variety of internal medicines, syrup of barberries, peppermint, etc., and finally advice as to food, which should be light and easily digested, such as chickens, young pigeons and the like. The other inconveniences the unfortunate abbot must expect are diarrhœa, headache, thirst, sleeplessness, exhaustion, want of appetite, and loss of flesh, for each of which appropriate advice is given.

NOTE.

The custom of boiling bodies is mentioned by Gibbon (cap. xlix.), and more fully by Haeser, i. 736. A contemporary writer tells the following story of the plague in Barbarossa's army: "A certain man was boiling his brother, when a friend sent to borrow the cauldron for a similar purpose, but he replied that he could not spare it, for after cooking his brother he should want to be cooked in it himself; which was also done". Henry of Salzburg, in Migne's *Patrologia*, vol. cxcvi., p. 1549.

Mundinus, *Anatomia*, Marburg, 1541. Guy of Chauliac tells us "Mondino of Bologna, who wrote on anatomy and practised it often, and my master, Bertrucius, acted thus: The body being placed on a table he made four lectures over it. In the first the nutritive organs were considered, for they are most corruptible, in the second the spiritual members (*i.e.*, lungs, heart), in the third the animate members (brain, etc.), and in the fourth the extremities" (quoted by Burggræve, *Précis sur l'Histoire de l'Anatomie*, Ghent, 1840). In the editions with which I am acquainted, Guy (*Chirurgia*, i. 1) mentions Bertrucius only, "Et ipsam (anatomiam) administravit multoties magister meus Bertrucius in hunc modum; collocato corpore mortuo in scamno, etc."; but doubtless his master, Mondino, practised in the same way. Gentilis Fulgineus, *Consilia*, Venice, 1503; Barth. Montagnana, *Consilia Medica*, Venice, 1497. The opinion of honourable practitioners of all ages as to the giving of medical advice by letter may be expressed in the language of Henry of Mondeville: "It is not safe, nor in accordance with the art, or with a right conscience, for a surgeon to give curative advice in serious cases to patients whom he has not seen; but he may, if he has legitimate excuse, give palliative counsel".

XXXIX.—MEDIÆVAL MILITARY MEDICINE.

SURGERY, and indeed the whole art of healing, owes much to war, that greatest of vivisectors, and this alone would justify our turning aside from time to time to consider military medicine. Tacitus tells us that the ancient Germans betook themselves after a fight to their mothers and wives, who did not hesitate to count and examine their wounds. They, doubtless, also employed some mode of treatment, though the tempting emendation of exsugere—to suck out—for exigere is not accepted by scholars. In the *Lay of Nibelungs* more regular practitioners make their appearance, for we hear that "those skilled in leechcraft were offered silver without weight and bright gold for healing the heroes after the battle," but this was not till they had returned home from the expedition. Some idea of the actual practice on the field may, perhaps, be gathered from an interesting passage in the companion poem, *Gudrun*, the German *Odyssey*. Here the old warrior, Wate, officiates as army surgeon, "for he had learned leechcraft from a wild woman," so he first dresses his own wounds, and then, taking an herb of marvellous power, and a plaster which he carried about with him in a box, he binds up those of his comrades; and so many did he cure, says the poet, that, had he been in a large army, "it would have taken camels to carry the gifts he would have got".

The military surgery of the Northern nations is closely similar. When St. Olaf was slain in Sticklestad fight, August, 1030, Thormod the skald was struck by an arrow in the left side, and retired to a barn, where he found women tending the wounded. One of them was boiling leeks in a pot and giving the broth to her patients, to see whether the wounds had reached the belly, for then they would smell of leeks. She asked Thormod why he did not get some one to look to his hurt, but he answered that he was not handsome enough for women to care for him, and had no presents to give. Then she took a pair of tongs and had a pull at the

arrow, but failed to extract it. "Cut open the wound," said Thormod, "till you can get a good hold, and then let me pull." So he got out the iron, with bits of flesh—red and white—sticking to the barbs. "The king has fed us well, I am fat to the heart roots," observed the hero, and with that he died. Thirteen years later, King Magnus the Good, of Norway and Denmark, defeated a great army of Wends near Sleswig, in one of the bloodiest battles ever fought in the North. He was concerned to find that there were not enough surgeons to look after the wounded, so he appointed those of his soldiers who had the softest hands to this office, and though they knew nothing of the healing art, they all became perfect leeches, doubtless by the aid of the king's father and patron, St. Olaf, who had wrought many healing miracles, both before and after his death. Their skill was inherited by their descendants, one of whom, Rafn Sveinbjornson, successfully performed the operation of lithotomy in the Island of Iceland about 1180 A.D., in the presence of a large company, each of whom had previously repeated five Paternosters. But he had travelled far in his youth, even to Italy, and probably owed his skill less to St. Olaf than to Salerno. His grandson, Rafn Oddson, again appears as an army surgeon, for he went with King Erik, the priest-hater, of Norway, on his expedition to Denmark (1289), and while tending the wounded was struck by three arrows, in the back, the arm, and the finger, the last of which caused his death. Thus, in the earliest middle ages, we find the wounded soldier looked after first by women, or by those of his comrades who possessed some surgical skill, and afterwards by professed surgeons, present either as forming part of the general levy, or attached to the king's person, or who had joined the army for the sake of the practice and presents they could pick up.

Saracen armies, as we have seen, were even accompanied by apothecaries, and Saladin had a medical staff of fifteen physicians, whose services can hardly have been confined to his own household. In the sixth book of the *Liber Almansoris* Rhazes gives a short chapter on the hygiene of camps,

advising, among other things, that when many soldiers are taken ill at once, they should immediately be separated from the rest on that side of the camp towards which the wind blows. It was probably on this that Arnald of Villanova based his treatise *De Regimine Castra Sequentium*, from which the following is an extract: "To test the purity of water take a thin, very white piece of linen, dip it in the water and hang it in the sun to dry. If spots of any colour appear, the water is pestiferous and should be avoided."

It is satisfactory to find that the English were not only the first of Western nations to use cannon in war, but also the first to originate something like an army medical service. When Prince Edward was stabbed in Palestine, it is very doubtful whether the wound was sucked by his wife; but there is good evidence that it was excised by an English surgeon, and the success of the treatment perhaps inspired him with respect for the healing art, for we find him accompanied in the invasion of Scotland (1299-1301) by no less than seven medical men. They included a king's physician and two juniors (*valetti*), a king's surgeon and two assistants (*socii*), and a simple surgeon. The king's physician and surgeon each received a knight's pay—two shillings daily; and the others, who ranked as esquires, half that sum. That they found plenty to do is indicated by the fact that the chief surgeon got compensation for three horses killed in Scotland "on the king's service". But this germ of a medical staff seems to have undergone no further development, for we hear nothing of military surgeons during the wars of Edward III., except that the Welshmen who fought at Crecy were accompanied by one of their own race. In the following century appear the often-quoted names of Nicholas Colnet, physician, and Thomas Morstede, surgeon, who went with Henry V. to Agincourt. Both were attended by three mounted archers, and Morstede had, in addition, twelve members of his own craft as his assistants. Colnet and Morstede were to receive one shilling, and their attendants sixpence per diem, together with a share of the

plunder, and their part of "the usual bounty," *viz.*, 100 marks (£66 13s. 4d.) per quarter for every thirty men during the actual campaign. If they got all this they were well paid indeed, but only one receipt has come down to us, in which Colnet acknowledges the payment of £8 6s. 8d. as half-quarter's salary for himself and his archers. Another surgeon, William Bredewardyn, seems to have been afterwards associated with Morstede, and they were allowed two waggons and a chariot for their baggage.

Field hospitals and ambulances on a large scale appear only at the very close of the mediæval epoch, and the credit of introducing them seems to belong to that noblest of queens, Isabella the Catholic. Speaking of the siege of Alora (1484), the Spanish historian, Hernando del Pulgar, writes: "For the care of the sick and wounded the queen sent always to the camp six large tents and their furniture, together with physicians, surgeons, medicines and attendants, and commanded that they should charge nothing, for she would pay for all. These tents were called the Queen's Hospital." On the surrender of Malaga, 1487, the Spanish army, on its entry, was followed by the Queen's Hospital in 400 waggons, "ambulancias". At the siege of Granada, two years later, an eye-witness, Peter Martyr, wrote to the Archbishop of Milan as follows: "Four huge hospital tents, the careful provision of queenly piety, are a sight worth seeing. They are intended not only for the wounded, but for those labouring under any disease. The physicians, apothecaries, surgeons, and other attendants are as numerous, the order, diligence and supply of all things needful as complete as in your suburban Infirmary of the Holy Spirit, or the great Milan Hospital itself. Every sickness and casualty is met and provided for by the royal bounty, except where Nature's appointed day is at hand." (Regia impensa quidquid languoris, quidquid accidentis emergit, ni status cuique a natura dies adsit abscinditur.) The queen herself frequently visited the wounded, and when her courtiers hinted that this was contrary to Castilian etiquette, she is

said to have replied: "Let me go to them, for they have no mothers here, and it will soothe them in their pain and weakness to find that they are not uncared for". Well may the admiring chronicler add: "Surely this queen deserved as much as those ancient Greek and Roman princesses that famous title, 'Mater castrorum'".

NOTE.

Germania, 8; *Nibelungenlied*, iv. 255; *Gudrun*, viii. 536 ff. The stories of Thormod and Magnus are from the *Heimskringla* (Laing's translation). For Rafn see Faye, *Rafn Sveinbjornsen's liv og Virksomed*, Christiania, 1878, and Husemann's review of this work in *Rohlfs' Archiv*, 1880. A very full account of early English military medicine is given by Smart, *B. M. J.*, 1873, vol. i. The agreements with Colnet and Morstede may be found in Rymer's *Fœdera*, 29th April, 1415, etc.

The relative rank of military surgeons as estimated by their salaries may be made clearer by the following account of the pay received by the English army in France in 1347: "Prince of Wales, one pound a day; Bishop of Durham and 13 earls, six shillings and eightpence each; 1046 knights, two shillings; 4132 esquires, one shilling; 5104 mounted archers, sixpence; 4374 Welshmen, fourpence; 15,480 archers on foot, threepence (Meynert, *Geschichte des Kriegswesens*).

Pedro Bosca, in his "Oration held at Rome, 1st November, 1487, before the sacred senate of cardinals, in celebration of the glorious victory gained at Malaga by the most serene and Catholic princes of Spain, Ferdinand and Helisabet" (*sic*), says the Queen's Hospital comprised nearly 400 waggons with awnings (*operti umbraculis*), and the wounded were nursed not by the highly improper persons who usually follow armies, but by "honestissimis et probatissimis matronis huic muneri servientibus et ministrantibus" (*Oratio Romæ habita*, etc., Rome, 1487).

On the general subject see Fröhlich, *Ueber die Anfänge der Militärmedicin im Mittelalter* and *Geschichtliches über die Militärmedicin der Deutschen* in *Rohlfs' Archiv*, 1880, 1882 respectively.

XL.—THE MEDIÆVAL PHYSICIAN.

WHEN King Gram went in disguise to a wedding for the purpose of carrying off the bride, he dressed in the dirtiest

rags he could find, sat among the lowest menials in the hall, and called himself a physician.[1] This is a sad contrast to the curled and scented dandies of the days of Aristophanes, but it is only one of many signs of the low social state of the profession during the early middle ages. Nor are the causes for this decline hard to discover. When the Christian Emperors, Valens and Valentinian, handed over the pagan Oribasius to "the most savage of the barbarians," in the pious hope that he would become a target for their arrows, they were disappointed to hear that his medical skill had raised him to the rank of a chief.[2] But the physicians of the West could compare neither socially nor professionally with Oribasius; they still belonged largely to the servile class, and their skill, whether in medicine or surgery, was not sufficient to impress the rude conquerors, who looked upon the free-born Romans themselves as little better than slaves. Medicine was, indeed, saved from entire degradation by its connection with the Church, which did so much to soften the horrors of the barbarian conquest; but the suspicion with which its practitioners were regarded is very clearly shown by the laws passed concerning them, as in the following examples from the Visigothic code.

"No 'medicus' shall bleed a free woman except in the presence of a relative, or, in case of necessity, of a respectable neighbour or servant, on pain of a fine of ten solidi." "No 'medicus' shall visit a prisoner unless accompanied by an official, for he may bring him a poison, and so defeat the ends of justice." "Before undertaking a case he shall enter into a contract and give pledges." "If a physician injures a freeman by bleeding, let him pay a hundred solidi; but if the patient dies, let him be handed over to his relatives to treat as they please. If a slave is injured or killed, the physician shall replace him by one of equal value."[3] This last law is especially important; it reappears in yet stronger terms in later codes, and was doubtless frequently put in force, and sometimes even exceeded. The plague which ravaged France in the sixth century attacked, among others,

Austragild, wife of Guntram, King of the Burgundians, "a good and God-fearing prince". Before her death she begged her husband, and adjured him by the bond of an oath, to execute her two physicians Nicholas and Donatus, on her tomb. The king did so, "but (adds Bishop Gregory) many considered that the deed was not without sin".[4] In 1337, some time before John of Bohemia went to fight and fall at Crecy, a travelling oculist offered to cure him of his blindness. He failed, and was promptly thrown into the river Oder.[5]

In 1464 King Matthias of Hungary was wounded by an arrow, the head of which remained in his arm. He made a proclamation like those in fairy tales. Whoever cured him should have great rewards, but if he failed he should lose his life. (Da schrib er aus wellicher im das eisen on shaden ausser thet, dem wolt er gross gutt geben, wo aber das nit gescheh muest er das Leben verlorn haben.) For four years no one ventured, "then came Hans of Dokenburg in Alsace and got out the iron. Then the king gave him great gifts, and smote (*schlug*) him a knight and a count, as he told me (Jerome of Brunswick) with his own mouth."[6]

"According to Hippocrates (says Lanfranc) wounds of the brain, heart, lung, bladder, stomach and small intestines are fatal. If, therefore, a surgeon is called to such a case shall he run away (*numquid fugiat*)?" He replies that if in his own country and of established reputation, the surgeon should do his best for his patient after giving due warning to the friends, otherwise he should by all means avoid such cases.

One result of the law was that practitioners refused to undertake dangerous cases at all, unless either the patient agreed to consider himself dead already, or his friends gave surety that they should not be held responsible for failure. About A.D. 1250, a nobleman of Bologna was injured in the side so severely that a portion of his lung protruded through the wound. For some time no one could be found to undertake the case, till at last an appeal was made to the two

most famous operators of the age, Hugh of Lucca, and Roland of Parma. Those intrepid surgeons, having obtained permission of the bishop, and taken an oath from thirty of the patient's friends that no harm should happen to them, boldly excised the protruded lung and applied a consolidative powder. The patient recovered, and went on a pilgrimage to Jerusalem.[7]

The close relation of mediæval medicine to the Church has already been noticed, but we must remember that there was always a distinct class of lay practitioners, and that the priestly "doctor" was usually looked upon with disfavour by his ecclesiastical superiors. In the Nestorian schools the students of divinity were, as we have seen, forbidden to follow the physicians, and similar efforts were made to check the practice of medicine by the Catholic clergy, especially in the eleventh and twelfth centuries. The sixth canon of the Council of Rheims, 1131, declares that "an evil and detestable custom has arisen that monks and regular clergy, despising the rules of the blessed Benedict and Augustine, practise law and medicine for worldly profit". Law is bad enough, and those rash men who occupy themselves therewith are to be severely chastised. But medicine is worse; nor is money-making its only objection—"*Cumque impudicus oculus impudici cordis sit nuntius, illa de quibus loqui erubuit honestas non debet religio pertrectare.* Wherefore, by apostolic authority, we forbid the continuance of this practice, and let the bishops, abbots, and priors who connive at such an enormity be degraded and excommunicate."[8] This canon was repeated by the second general Lateran Council, 1139, and again at Montpellier in 1162, when it was applied to all "religiosi". The fourth Lateran Council, 1215, forbade all subdeacons, deacons, and priests to practise that part of surgery which has to do with burning and cutting; and, finally, Pope Honorius III. prohibited all persons in holy orders from practising medicine in any form. The number of these decrees indicates their want of effect. Distinguished clerical surgeons, as, for instance, Theodoric and Guy of

Chauliac, continued burning and cutting, in entire disregard of the oft-quoted "*ecclesia abhorret a sanguine*," and the final separation of medicine from the Church was probably due to more general causes, such as the increasing complexity of the art, the rise of the great secular universities, Salerno, Montpellier, Padua, and Bologna, and especially to the fact that the recognised medical text-books were translations from the works of misbelieving Moslem, whose chief Christian exponents had been convicted of numerous and deadly heresies.

The most lively picture of the mediæval physician is given in a twelfth century treatise entitled *De Adventu Medici*, or "The Doctor's Visit," and attributed to Archimatthæus, one of the Salernitan masters. The following is a condensed abstract of this work, which, in spite of its quaint piety, contains so much of the wisdom of the serpent that it compares somewhat unfavourably with analogous passages by pagan physicians. "When called to a patient commend yourself to God and to the angel who guided Tobias. On the way learn as much as possible from the messenger, so that if you discover nothing from the patient's pulse or water, you may still astonish him and gain his confidence by your knowledge of the case. On arrival ask the friends whether the patient has confessed, for if you bid him do so after the examination it will frighten him. Then sit down, take a drink, and praise the beauty of the country and the house, if they deserve it, or extol the liberality of the family. Next proceed to feel his pulse, remembering that it may be affected by your arrival, or, the patient being a miser, by his thinking of the fee. Do not be in a hurry to give an opinion, for the friends will be more grateful for your judgment if they have to wait for it. Tell the patient you will cure him, with God's help, but inform his friends that the case is a most serious one. Look not desirously on the man's wife, daughter, or handmaid, for this blinds the eyes of the physician, deprives him of the divine assistance, and disturbs the patient's mind. If, according to

custom, you are asked to dinner, do not hasten to take the first place, unless, as is usual for the priest and the physician, it is offered to you. Often send to inquire how the patient is, that he may see you do not neglect him for the pleasures of the table, and on leaving, express your thanks for the attention shown you, for this will please him much." Then come directions for treatment in simple cases, and finally the important question of the fee. "When the patient is nearly well, address the head of the family, or the sick man's nearest relative, thus: 'God Almighty having deigned by our aid to restore him whom you asked us to visit, we pray that He will maintain his health, and that you will now give us an honourable dismissal. Should any other member of your family desire our aid, we should, in grateful remembrance of our former dealings with you, leave all else and hurry to serve him.'"[9] Another Salernitan suggests a terrible vengeance which may be inflicted on a nonpaying patient. "Contrive that he shall take alum instead of salt with his meat; this will not fail to make him come out all over spots."

The above treatise was afterwards developed into a regular quack's hand-book under the title *De Cautelis Medici* (Hints for Doctors), falsely attributed to Arnald of Villanova.[10] It contains the following amusing advice: "Suppose you know nothing, say there is an obstruction of the liver. Perhaps he will reply: 'Nay, master, it is my head or legs (or other members) that trouble me'. Repeat that it comes from the liver or stomach, and especially use the word obstruction, for patients do not understand it, which is very important." "When you go to a patient, always try and do something new every day, lest they say you are good at nothing but books." "If you unfortunately visit a patient and find him dead, and they ask why you are come, say you knew he would die that night, but want to know at what hour he died."

Towards the close of the fifteenth century, another book of *Hints for Doctors* (Cautelæ Medicorum) was written

by the celebrated anatomist and physician, Gabriel *Z*erbi.[11] Here is the last chapter "On the Physician's Externals": "Let his house be rich with regard to his profession, or, at least, not entirely poor, and known to all that it may be found on necessity. But in private matters it should be quiet and frequented by few, and not marked by bandages and medical sign-boards. It is not for a physician to seek festivities, dances, and merry-makings (*tripudia*); nor should he be a beater of musical instruments, or a frequenter of *prosti uli*. Let him not converse with notorious sinners or infamous persons, especially homicides. He should not take part in public matters, or merchandise, for thus the basis of medicine is neglected, the confidence of patients diminished, and the physician is considered useless or harmful. Let him not buy his own necessaries, especially daily food, for he thus becomes familiar with the vulgar, and is held cheap by them. He should not take part in hunting, soldiery, agriculture, or alchemy, by which last men are only made richer in hope, soot, and stupidity. He should not walk pompously about the town. In fine, as saith Haly Abbas: 'If a physician will be perfect, let him observe those who are guided by morality and cleave to them, so will his art be attractive to men, and they will incline unto him, and love him, and his name will be honoured among them; and besides these pleasures and advantages he will have his reward of God also'." *Z*erbi inculcates special caution in prognosis. "I am now an old man (he says) but have never had reason to blush for mistakes in this matter." He forgot, alas! the warning of Solon, for being sent by the Venetian Senate to attend a distinguished Turkish pasha, he left his patient, as he thought, convalescent, and went off with a large fee. Shortly after his departure the pasha died, and his friends, suspecting treachery, pursued and captured the unhappy physician, whom they sawed asunder between two planks on the coast of Dalmatia, and his son with him.

NOTES.

[1] Saxo Grammaticus, i. 9.

[2] Eunapius in *Vita Oribasii.*

[3] Canciani, *Leges Barbarorum*, iv. 180. The laws of the Christian kingdom of Jerusalem were still severer both against regular and irregular practitioners. This is how the latter were dealt with: "Et sel avien che alcun medico medicarà in la cità senza licentia de la corte et del Vescovo, la corte deve prenderlo et farlo frustar per la terra, de jure et per l'assisa del Reame de Hierusalem" (*op. cit.*, ii. 529).

[4] *Hist. Franc*, vi. 36.

[5] Magnus, *Der Augenärztliche Stand in Seiner Geschichtlichen Entwickelung, Rohlfs' Archiv*, 1878.

[6] Heronymus Brunschwig, *Handwerk der Wundarztnei*, Strassburg, 1497, tract. ii.

[7] Roland says he was the operator, but Theodoric declares that his master, Hugh of Lucca, attended the patient while Roland merely looked on. There was doubtless much jealousy between the rival schools of Salerno and Bologna.

[8] *Sacrorum Conciliorum Collectio, sub anno.*

The ninth canon of the Council of Clermont (1130) is to the same effect. The prohibition was probably suggested by St. Bernard, whose influence was then very great, and whose attention was, perhaps, directed to the matter by the following case. A monk, Benedict, fled from Flavigny to Clairvaux, where he was sheltered by St. Bernard. When the abbot of Flavigny demanded his surrender, the saint replied: "We took him in because he said you had used him not as a monk but as a mediciner, and had compelled him to treat tyrants, robbers, and excommunicate persons to the peril of his soul, so he had fled from his own damnation". The abbot replied that the said Benedict had not been compelled to practise medicine, but had persisted in doing so "through love of lucre and a vagabond life," but St. Bernard refused to give him up (see *Ep.* 67, Migne's edition).

Another reason for the prohibition was that it was considered improper that a priest should even appear to be the innocent cause of death or danger to his neighbours. A subdeacon had, before his ordination, accidentally wounded a boy. The wound healed, but broke out again a year afterwards, and "through the carelessness of physicians" the boy died. Pope Clement III. (1188-91) decided that the subdeacon might retain his office, but was not to be admitted to the priesthood, "quia occasionem morti ejusdem pueri dedisse videtur". The same Pope writes as follows to a certain R——, canon of Cologne: "We hear that you are skilled in physic, and have given medicines to many, according to the traditions of that art, with due care. Yet the result has

oftentimes been contrary to your expectation, and many persons after taking your remedies have come in peril of death. Since, therefore, you now wish to take holy orders and ask our advice thereon, we reply, briefly, that if your conscience reproaches you in any way whatsoever with regard to these matters, you will not, by our advice, take higher orders." Canon R—— was, therefore, not in holy orders, and this seems to have been the case with most mediæval medical "clerks," who sometimes took what were called minor orders to enable their royal or princely patrons to recompense their services cheaply by some ecclesiastical sinecure. Jaffé, *De Arte Medica Sæculi*, xii., Berlin, 1853.

[9] Two versions of the *De Adventu Medici* in prose and verse are published in the *Collectio Salernitana*, and a third may be found in the Benedictine *Histoire Littéraire de la France*.

[10] Published in Arnald's *Opera*.

[11] In Panthaleon de Confluentia, *Pilularium*, etc., Lyons, 1528.

XLI.—THE MEDICAL PROFESSION IN THE MIDDLE AGES.

"WHOSOEVER will henceforth practise medicine, let him present himself to our officials and judges to be examined by them; but if he presume of his own temerity, let him be imprisoned and all his goods be sold by auction. The object of this is to prevent the subjects of our kingdom incurring peril through the ignorance of physicians."

The above edict, promulgated in 1140 by Roger II., King of the two Sicilies, is the first known legal enactment for the regulation of medical practice in Europe. Roger, who was a great friend of "Saracenic studies," had many Arabs at his court, and his medical law was not improbably copied from the regulations long in force in the East. His grandson, the Emperor Frederick II., called the "World's Wonder," was notorious for his addiction to Moslem manners and learning, and his medical enactments are of great interest and importance. The following are the chief: "Considering the harm which may arise from the ignorance of physicians, we ordain that no one shall henceforth practise

physic unless he be first publicly examined by the masters at Salerno, and present testimonials, both from them and from those appointed by us, to ourselves or our representative, and receive from us or him licence to practise". "Since the science of medicine can never be understood without some previous knowledge of logic, we decree that none shall study medicine unless he have studied logic for at least three years. Then let him learn medicine for five years, and also surgery, which is a part of medicine." On receiving his licence he must take oath to attend the poor gratis, and to denounce any frauds of the apothecaries, and must still remain for a year under the supervision of some older practitioner. "He shall visit the sick at least twice daily, and once at night, if required. He shall not charge a patient in the town more than half a tarenus, or one in the country more than three tareni, if his expenses are paid, or four if he pays his own"—a "tarenus" was worth about three shillings. "No surgeon shall practise until he has given evidence to the masters of the medical faculty of having studied that part of medicine at least a year, and especially of having thoroughly learnt human anatomy, without which neither can incisions be safely made, nor fractures cured."

The sale of poisons was simply and effectually regulated: "Whosoever shall have or sell any poison or noxious drug, not useful or necessary to his art, let him be hanged". "Those who give magic drinks and love philtres, if they cause bodily harm, shall be punished with death, but if the recipient is uninjured, they shall forfeit all their goods and suffer a year's imprisonment. Investigators of truth and nature know that these arts are foolish and fabulous, but even the intent to do evil should not go unpunished." "We consider it our duty," continues the scientific emperor, "to preserve, as far as possible, the salubrity of the air; wherefore we decree that no hemp or flax be placed for maturing in water within a mile of any town or camp, for we have learnt for certain that the air is corrupted thereby; let those who do so forfeit their hemp or flax and be brought

before our courts. We order that the depth of graves be not less than half a 'canna'; penalty, a fine of one augustale." Bodies of animals and other refuse must be suitably disposed of on pain of a fine of one augustale for things larger than a dog, and half that sum if smaller.

Among university studies medicine ranked lowest of the superior faculties, but as in ancient times it might boast of being the only profession which had produced a god, so in the middle ages the beneficent science gained for its students the beautiful title "ordo gratiosus". The title "doctor" was given even in classical times to teachers of the liberal arts, but it was first employed in something like its modern sense at the end of the twelfth century by Gilles of Corbeil, who uses it to denote the Salernitan masters, while about the same time Roger of Parma calls his teacher "noster doctor," "egregius doctor". With the addition of various complimentary epithets, the term was applied to the great schoolmen of the thirteenth century, and Arnald of Villanova calls himself indiscriminately "doctor" and "magister" medicinæ. By the end of that century it had become a recognised degree at Salerno, whence it spread to other universities. The candidate, after going through the above-mentioned curriculum, was further required to defend four theses on passages from Hippocrates, Aristotle, Galen, and one modern author. He then took oath not to contradict the college; to teach nothing false; to recommend the sacrament of confession to his patients; to receive no pay from the poor, even when offered; to enter into no dishonest league with apothecaries; and to administer no noxious drug. Finally, he received a ring, a wreath of laurel and ivy, a book first closed and then opened, the kiss of peace, the rank of Doctor in Philosophy and Medicine, "et facultatem has scientias ubique terrarum profitendi, exercendi, docendi, interpretandi, corrigendi, et de iis quæ ad illas spectant disserendi, necnon quod visum fuerit sua auctoritate statuendi, ac ubilibet cathedram ascendendi," but he must not practise surgery on pain of a fine of 500 ducats.

Mediæval surgeons may be roughly divided into three classes: (1) those of the "long robe," such as Lanfranc and Guy of Chauliac, who equalled the physicians in learning, and usually surpassed them in practical knowledge; (2) the bulk of the profession who were closely connected with the barbers and bath-keepers; and (3) the wandering lithotomists, rupture curers, and other specialists. The two latter classes were much despised by the "pure physicians," but we shall shortly come across representatives of both, who are justly famous in medical history. A description of the relations of these several grades to one another, and of the regulations concerning them in various countries, would far exceed the scope of this chapter, and we need only mention that they were sometimes licensed by the bishops, a practice originating perhaps in the custom, of which an example has already been given, of obtaining their permission before performing any perilous operation.

The recently published work of Henry of Mondeville gives an interesting account of how crafty physicians and surgeons attempted to invade each other's department. "If such a physician is called to a patient, and finds that he has a surgical disease, he will say: 'Sir, it is plain (*planum est*) that surgeons are proud and pompous, yet entirely devoid of logic and utterly ignorant; or if they know anything they have learnt it from us physicians; they are also rough men (*feroces*) and demand high fees. On the other hand you are weak, suffering, and delicate, and have heavy expenses, so I advise you not to seek their counsel; and I, from regard to you, though I am not a surgeon, will try to help you without them.' If the patient recovers, well; but if not, then the physician will say: 'Sir, I told you at first that I was not a surgeon, but for the said reasons and because I pitied you, I did what I did well, and according to art and logic, and better than any surgeon, God knows. But I am just now occupied in certain business which prevents me attending to you as usual, so I advise you to call in a surgeon.' Then he contrives that a wretched, ignorant surgeon shall

be summoned, and that for four reasons—(1) that he may be unable to discover the physician's mistakes; (2) that the physician may dominate over him, and continue surgeon as before; (3) that if necessary he may throw the blame of his errors past and future on the surgeon, and (4) that he may attribute all the honour to himself." Henry impartially draws a companion picture of the crafty surgeon, who tells his medical patients that physicians know nothing, and do nothing but talk and dose every one indiscriminately with purgatives "which are most unsuited for your case," etc. Such are the crafty and deceptive of both classes, but there are also scientific and experienced practitioners with whom it is a solace to consult. This is how a consultation should be conducted: "First the diseased part should be most carefully examined and felt, for, as Haly Abbas saith, 'surgical diagnosis consists in feeling with the hand and observing with the eye'; and let each do this in turn, repeating the examination if necessary, and pointing out to one another any noticeable signs both in the diseased part, and in the patient generally. Then let him who is of most authority, preferably a physician, say to the patient: 'Sir, we have carefully examined your case, and you ought to rejoice and be very glad that we are so many and such able men here, sufficient for a king, and the least of whom is fully competent to work out, follow up, and complete the cure of your disorder'. Then he should inquire into the circumstances of the case, saying: 'Sir, excuse us (*non displiceat vobis nec habeatis pro malo*), but how long is it since this disease attacked you?' Then let him ask other questions, as laid down in section 45, the others carefully attending. After this they should all go into another room where are none but themselves, that they may better discuss the truth, and that there be no witnesses of the discords and quarrels which sometimes happen. And let the chief among them call upon the others to speak in turn, beginning from the youngest or least, for if the greater speak first the others will fear to differ from them. He should ask what the disease is, what authors have made

mention of it, and where. Whether it is curable, and if so, how, etc. Take for example an abscess in a fleshy part; let him ask of what matter or humour it is; if of blood, in what stage, whether evacuation is indicated, and of what kind; if by venesection, in which vein and when, considering the stage of the disease, position of the moon and heavenly bodies, and an infinity of other matters."

One of the earliest signs of the revival of medicine was the restoration of the public or communal physicians, as at Bologna and Venice, the mercantile people of which latter city, with a keen eye for obtaining the best value for their money, did not hesitate to employ even unconverted Saracens. In 1436 the Emperor Sigismund decreed that every imperial city in Germany should have a public medical officer, who should be paid 100 gulden yearly from Church revenues, and attend the poor gratis, "for the high masters in physic never do this, and therefore they go to hell". The "archiatri of the palace," or royal physicians, were restored in the reign of the Emperor Charles the Bald, whose Jewish doctor, Zedekiah, was accused, probably with equal truth, of being a sorcerer and of poisoning his master. It is in this capacity that we meet with the last Greek practitioner who might trace some connection with the great men of old. Angelus of Cyprus, for seven years (1364-71) physician to Charles the Bad of Navarre, was "a very learned clerk, versed in the Latin tongue, and powerful in argument"; so his master suggested that he should use these qualities to ingratiate himself with his cousin, Charles V. of France, and take an early opportunity of poisoning that monarch. Rather than obey the physician fled from the court, and was never seen again, but report said that he had been overtaken and put to death by the king's order.

Charles the Bold of Burgundy had six physicians, one of whom always stood behind his chair and told him what he might eat.

NOTE.

The laws of Roger and Frederick and the regulations of the school of Salerno are given in the *Collectio Salernitana.* The obligation to recommend confession seems to have been especially distasteful to physicians. We find the ecclesiastical authorities first pointing out its utility even from a medical standpoint, "for many diseases are due to sin, and the cause being removed by confession and penance the effect will cease". This being apparently ineffectual they proceed to decree the lesser excommunication against those doctors who neglect this duty; and finally the aid of the secular arm was called in, and a fine of four oz. of silver imposed upon each omission.

The earliest mention of a "doctor" in the Salernitan archives is the following: "Obiit A.D. 1200. Magister Thomasius Saracenus, clericus Salernitanus, Doctor in Physica." *Collectio*, iii. 332.

XLII.—UNPROFESSIONAL MEDICINE IN THE MIDDLE AGES.

In mediæval medical writings we frequently come across the terms "laicus" and "idiota," applied to practitioners who had received no regular education, *i.e.*, were not "clerks," and who were acquainted only with their native tongue. The Greek "idiot" was a man who took no part in State affairs, the mediæval "idiot" was one who knew no Latin. But the words are also used to denote the amateurs of the healing art, who were as numerous then as now, and it may be interesting to consider some aspects of this unprofessional medicine as exemplified by kings, saints, bishops, priests, and the general public.

Henry of Mondeville distinguishes two classes of "idiotæ": (1) the proud and stupid who boast of their hereditary knowledge and experience, and oppose the orthodox practitioners in every way; (2) those whose circumstances have prevented their acquiring a regular education, but who respect the ordinary surgeons, are ready to learn from them. Besides these, however, there is a third class of amateur practitioners. "It is not very wonderful (says Henry) that poor men driven

by necessity take refuge under the cloak of surgery, since that art is in universal request, and the vulgar cannot distinguish the skilled from the ignorant. But it is more than wonderful that not only the aforesaid, but kings, princes, prelates, canons, curates, monks, dukes, nobles, and burghers should, without any previous knowledge, take in hand perilous cases of surgery, especially the cure of eye affections, which are most dangerous, difficult and fallacious. And through their errors, particularly those of rich men, monks, hermits, and recluses, in whom the vulgar have greatest trust, diseases curable in themselves become incurable, or at least worse than before. And sometimes they destroy the affected organs, and often kill the patient. But the people hold that the said monks and their like have a knowledge of surgery apart from experience infused into them by the grace of God, and if any one doubts this, he is reputed a heretic, or an infidel and infamous person."

The history of "touching" for scrofula by English sovereigns has been so often related that we may confine ourselves to a short account of the practice by French kings. In the opinion of St. Thomas Aquinas there is no better proof that Divine grace is given to anointed monarchs, than the undoubted fact that the power of healing diseases was thereby bestowed on that strange "eldest son of the Church," Clovis the Frank, A.D. 496. But he does not mention scrofula, and the earliest notice of a special power of healing that disease is probably the following passage from Abbot Guibert de Nogent, author of the famous *Gesta Dei per Francos*: "What a prodigy is that which we see practised by our sovereign lord Louis [the Fat, 1100-1137]. I have seen those who have swellings on the neck or elsewhere run in crowds to be touched by him, while I was present and trying to keep them off. But he, with his natural kindness, gently beckoned them to him, and humbly signed them with the sign of the Cross. His father Philip often performed this glorious miracle, but lost the power through falling into some sin. I pass over what other kings do in this way, but

I know the King of England never attempts it." Henry IV. is said to have healed more than 1500 patients, and to have touched nearly four times as many every year. "After the ceremony," says an ancient chronicle, "the king wiped his fingers on a cloth dipped in wine and water, and then dined, though he seldom had much appetite thereto, because of the unpleasant smells and sights; but charity overcometh all things." The custom was continued till the Revolution, and when, about 1750, D'Argenson sent the ministers of Louis XV. details of a case which had actually recovered after being "touched," he received the crushing reply: "Monsieur, the prerogative of the kings of France to cure scrofula is proved by such unquestionable evidence that it is unnecessary to confirm it by particular instances". Many cases of failure, however, occurred, even in the ages of faith, one of which is of special interest. In 1483 the crafty and superstitious Louis XI. sent for St. Francis of Paul, who had wrought many wonders in Italy, to heal him of the results of an apoplexy. That holy man suffered from scrofula, but the historian is obliged to confess that neither the saint could cure the king nor the king the saint.

The power of mediæval saints to heal the sick, like that of the kings of France, is so notorious that it is needless to give examples; but one of their number has special claims to a place in the history of medicine, St. Hildegard of Bingen (1098-1179), who shares with her contemporary, Avenzoar, the honour of having first mentioned the itch mite. According to some modern writers she established a school of nurses (!), but there is no mention of this in her letters or authentic biographies. Her own patients, at any rate, required no nursing, for she cured them in the miraculous manner appropriate to her saintly character, and we are told that hardly any sick persons applied to her who were not instantly healed. But for the benefit of those less highly favoured, St. Hildegard wrote several medical books, of which the best known is the *Physica*, a description of the nature and medical properties of minerals, herbs, fishes,

birds and animals. We shall again refer to this work when discussing the doctrine of "Signatures," but the reader may be interested by the following description of the unicorn, in which it is hard to say whether the saint is consciously or unconsciously humorous. "As the serpent in the Garden of Eden avoided the man and gazed at the woman, so this animal flees from men and follows females. A certain philosopher, skilled in the ways of beasts, had long hunted a unicorn, but could not catch him, whereat he marvelled greatly. But one day he went hunting with a company of men and women, and the unicorn, seeing the girls, slackened his pace, sat on his hind legs, and stared at them. And the philosopher, when he had diligently considered this, saw that the animal might thus be caught, so he came up behind him and captured him. For the unicorn, when he sees a girl, marvels that she has no beard, and yet has the form of man, and if there are several girls he marvels the more and is caught the more easily. Get a unicorn's liver and make it into an ointment with yolk of egg. There is no leprosy of any kind which this will not cure, if the patient uses it often, unless his death is foreordained, or God willeth not that he be healed. Make a belt of unicorn's skin, and wear it next your own, and no pestilence or fever will harm you."

She ascribes greater virtues to arnica than does the wildest homœopath: "If any one touches a man or woman with green arnica they will burn in love for him, and as the herb dies the man or woman touched will become infatuated by the love with which he is inflamed, *ita quod stultus deinceps erit*". (The saint, says her biographer, never learned Latin but wrote it by Divine inspiration.) "Henbane: Where there are 'suren' in a man which ulcerate his flesh rub him in the same place with its juice, and the 'suren' will die." Probably a reference to scabies; for the words "syro," "syrones" were used even in the last century to denote the acarus, and other parasites. "Nightshade (belladonna?) is hot and dry, and whoso has pain at the heart or has fainting fits (*in corde unmechtig ist*) let him boil nightshade in water

and apply it hot to the heart and he will be better. And whoso has toothache let him place the same on his cheek where the pain is, and it will cease. And when the feet swell, place nightshade warmed in a little water thereon and the tumour will subside; and whoso has pain in his legbones let him apply hot nightshade to his legs, and tie a cloth over, and he will be better."

The monasteries, as we have seen, were the mediæval dispensaries, and the clergy were not only often regular members of the medical profession, but held that the treatment of the numerous so-called supernatural diseases belonged especially to their order. In times of pestilence bishops wrote pastoral letters exhorting their flocks to avoid bodily and cleave to spiritual aids, for it is better to fall into the hands of God than into the hands of man. Plagues are Divine punishments, and the temptation to use physical means of cure must be avoided as a snare and a sin, "lest haply they be found even to fight against God". It was perhaps well that they abstained from recommending medicines, if we may judge from the following example given by Guy of Chauliac. Speaking of opiates, he observes that in administering such drugs the dose and time must be carefully considered. "It was this that made the physicians suspect those lozenges which the Lord Bishop of Riegs recommended to the Lord Bishop of Marseilles, who suffered from a painful strangury, after taking whereof he died in his sleep." He then gives the prescription, which included five drachms of opium, and one of henbane! As an agreeable contrast to the above, it is interesting to find that in 1255 Walter de Kirkham, Bishop of Durham, ordered all the clergy of his diocese to solemnly exhort mothers from the pulpit not to take their babies to bed with them, for through this habit many were suffocated, an excellent piece of episcopal advice which might be repeated with advantage.

In modern times the clergyman and the Lady Bountiful are the most prominent of amateur practitioners, and we may conclude with two mediæval examples of these forms of unpro-

fessional medicine. The following is the seventy-third *Observation* of Antony Benivieni (1440-1502), a physician whom we shall meet again shortly: "An acquaintance of mine, Michelotti, was troubled with hernia, and went to a priest who professed to cure that disorder. Without reducing the rupture, the latter immediately put on a tight bandage. The bowel remained so compressed for a week, and became inflamed, causing the patient great pain. Suddenly the pain ceased and he became delirious, so, at last, I was sent for. Having felt his pulse, which was hardly perceptible, and seen his pale face and sunken eyes, I ordered the priest to be summoned. Then I removed the bandage, and saw the whole part blackened, with an ulcer showing the putrid intestine. He died in a few hours, leaving us a useful example and warning not to entrust our sick bodies to priests, who are only required to cure the soul, but to the more learned physicians."

Sometimes, however, even learned physicians and surgeons quote lay prescriptions with approval. Thus Lanfranc, after describing how to make a truss with a piece of sheet iron and a bandage, adds: "Give the patient also every day five drachms of powdered valerian root in wine. This powder has a marvellous effect, as I have often proved. I got the receipt from one who had it of a certain noble lady, who treated all ruptures therewith."

NOTE.

Guibert de Nogent, *De Pignoribus Sanctorum*, lib. i. The attempt of St. Francis to cure Louis XI. is related by Comines, and Raynauld, *An. Ecclesiast.*, 1483.

The *Opera S. Hildegardis* are published in Migne's *Patrologia;* see also Renard, *Histoire de Sainte Hildegarde*, Paris, 1865; Dahl, *Die Heilige Hildegardis*, Mainz, 1852. The story of the philosopher is not found in some MSS.

A good specimen of a medical pastoral is that by the Blessed Ernestus, first Archbishop of Prague, *De Remediis Spiritualibus in Peste Adhibendis*, written 1349, during the "black death" (in Balbinus, *Miscel. Hist. Regni Bohemiæ*, vol. viii.). But the secular powers outdid the spiri-

tual in this direction. Thus the Emperor Justinian justifies the severity of his law against blasphemy (*Novella*, xxviii.) by saying that that habit is a common cause of plagues, famines, and earthquakes: and nearly a thousand years later Kaiser Maximilian attributes a like origin to a disease which might with some show of reason be considered a Divine punishment, declaring in his edict against profane language (1495) that "this is the undoubted cause of that horrible disease known as the 'malum francicum' which has recently appeared among us".

For Bishop Kirkham see the *Sacrorum Conciliorum Collectio*, xxiii. 901.

XLIII.—THE REVIVAL OF LEARNING.

THE Renaissance or age of reformation has been compared to a tree which puts forth fresh buds and blossoms in spring-time while the withered leaves of the previous autumn still hang thick upon its branches, and the image may very fairly be applied to the changes which then took place in the healing art. Though we date the beginning of a new epoch in this as in other departments of human knowledge from the invention of printing and the revival of Greek in the middle of the fifteenth century, nearly 200 years elapsed before the new spirit could be said to have become predominant in medicine. The fruits of the physical sciences ripen more slowly than do the more direct products of the intellect, and it was not till a century after Raphael and Luther that the world was ready for Harvey and Galileo. The influences of the age, however, manifested themselves during this interval in many ways, the more important of which will now be briefly considered.

To take first the revival of classical learning. This begins, from the point of view of the medical historian, with the year 1443, when Thomas of Sarzana, afterwards Pope Nicholas V., discovered in the church of St. Ambrose, at Milan, a manuscript of the *De Medicina* of Cornelius Celsus, which had disappeared for many centuries. It was one of the first medical books printed, and gave the physicians

of the age their earliest opportunity of studying the best side of the Hippocratic medicine undimmed by the medium of imperfect translations. Ten years later came the fall of Constantinople, and the dispersal of Greek teachers and Greek manuscripts throughout Western Europe. Among the scholars and critics who now sprang up on every side physicians hold a prominent place. At Ferrara, Nicholas Leonicenus translated the *Aphorisms* of Hippocrates, and pointed out the many errors in that oracle of the middle ages the *Natural History* of Pliny the Elder. At Strasburg and Paris, Günther of Andernach, professor at once of Greek and of anatomy, translated Galen, Alexander, and Paulus into classical Latin. At Metz, Anutius Foesius devoted forty years of his life to producing a worthy edition of the works of the Father of Medicine. Meanwhile, our own Linacre was studying physic at Padua and Greek at Florence, where he perhaps took from the Platonic Academy established by the Medici the model of that more famous Royal College of Physicians which he himself founded in London (1518). These are but a few of the medical philologists of the age, and it is interesting to notice that representatives of the Teutonic nations, England and Germany, now become the rivals, and even the teachers of the French and Italians, John Kaye (Caius) lecturing on Aristotle at Padua, while Günther of Andernach taught anatomy at Paris.

The substitution of the works of Celsus and Hippocrates for bad translations from Galen and Avicenna was a great advance, and had, as we shall soon see, a marked effect on medical practice. But the revival of learning gave birth to something of yet greater import and of far wider influence—the spirit of criticism, which, beginning with the disputes of grammarians, gradually invaded every department of human thought and action. When not only passages, but whole treatises, hitherto believed to have been written by Galen or Hippocrates, were shown to be doubtful or spurious, it was natural that men should look for some higher criterion of medical truth than imperfect manuscripts, or still more

imperfect translations, and we find one of the earliest philological physicians, Nicholas Leonicenus, inquiring: "Why has Nature given us our eyes and other senses, unless that we might rely upon ourselves in the search for what is true?"

In all periods of transition three different classes of men usually make their appearance—the sober reformers, who gradually assimilate the new while holding fast whatever is good in the old; the stubborn conservatives, who refuse to adopt or to give up anything; and the revolutionists, whose aim it is to make a clean sweep of everything in order to set up brand new theories and systems of their own. In medical history the first of these classes was represented by the above-mentioned scholars, or "Greeks," as they were called, and by the great anatomists and clinicians who succeeded them; the second was composed of the "Arabists," or adherents of the dominant school, whose chief text-book was the *Canon* of Avicenna; while the third comprised the mystic, chemical, or Paracelsic physicians, of whom we shall have much to say shortly; and the whole of the sixteenth century is occupied by a sort of triangular duel between the three parties. One of its most striking episodes was the great controversy between the Greeks and Arabists on the question of bleeding in pleurisy, or rather pleuro-pneumonia. Peter Brissot, a distinguished French physician, and great admirer of the Greeks, concluded from his study of the ancients, and observation of an epidemic in 1515, that the Arabist rule of bleeding at a distance from the part affected, or "revulsion," as it was called, was contrary to reason, experience, and Hippocrates, and a danger to the human race, and that the only true method was that of "derivation," or venesection on the same side as the disease. This was made a test between the two schools, and Brissot, though he made some important converts, was condemned by the faculty of Paris, always the seat of conservatism in medicine. He therefore betook himself to Spain and Portugal, ostensibly to study the medical properties of the strange herbs then being brought from the New World. But his controversy

followed him and raged still more fiercely after his death (1522), and the publication of his *Apology*, in which he defends the Greeks, and attacks the Arabs, with much eloquence and learning. The adherents of the latter appealed first to the University of Salamanca, and, when it decided against them, to the Emperor Charles V., to whom they declared that the derivationists were the Lutherans of medicine; but a relative of the monarch had recently died under Arabist treatment, so he also decided for the Greeks. Meanwhile the Italian physicians attempted to settle the matter by holding a synod, on the theological model, at Bologna, under the presidency of Pope Clement VII., but the prestige of the classic learning and of the term "Hippocratic" was alone sufficient to secure the final victory of the Greeks, though the controversy smouldered on till it was extinguished by Harvey's great discovery.

At the close of the fifteenth century the Arabist school was still decidedly predominant, as is shown by the medical curriculum introduced in 1481 at Tübingen, a recently-founded university, which would naturally adopt the system most in vogue. The course extended over three years, and was thus arranged. First year: Mornings, Galen's *Ars Medica;* afternoons, the two first chapters on fevers, from the *Canon* of Avicenna. Second year: Mornings, Avicenna, book i., on anatomy and physiology; afternoons, the ninth book of Rhazes' *Liber Almansoris*, or the corresponding part of the *Canon*. Third year: Mornings, the *Aphorisms* of Hippocrates; afternoons, Galen, *On Internal Diseases*, or *On the Regimen of Health*. Additional lectures were given on the surgical part of the *Canon*, on Mesuë's *Simple Medicines*, and on Constantine's *Viaticum*, also a translation from the Arabic. "Every three or four years, in the coldest season after Christmas, the body of an executed criminal shall be dissected (says the statute), if it can be got. All who take part in the dissection shall attend a mass for the subject's soul every morning; they shall take oath not to remove any part of the body; and they shall all attend

the remains to the grave." In the above list we find a proportion of six Arabic to three Greek text-books, but by the end of the next century this will be more than reversed, after which the Arabic writers rapidly disappear.

The appearance of new and the development of old forms of disease, *e.g.*, the sweating sickness and scurvy, played an important part in overthrowing the authority both of Greeks and Arabs, and this influence is well seen in the last important product of the Arabist school, the *Practica Copiosa* of John of Vigo, which went through more than twenty editions within thirty years (1514-44), an unparalleled event in the first century of printing. John of Vigo, who calls himself "Doctor of Surgery," was medical attendant to Pope Julius II., and accompanied that warlike Vicar of Christ on his numerous campaigns. The marvellous success of his work seems to have been mainly due to the fact that all the recognised text-books of surgery had been thrown out of date by the increasing importance of gunshot injuries, and the development of that specific disease which broke out with such virulence at the close of the fifteenth century; for the *Practica Copiosa*, though well arranged and clearly written, is merely a hash-up from Guy of Chauliac and other Arabist surgeons, flavoured with extracts from the recently discovered Celsus, and with the addition of two important sections on the subjects above noticed. The following is the substance of Vigo's teaching on gunshot injuries: "Such wounds are compounded of three kinds, (1) they are bruised wounds because of the roundness of the bullet; (2) they are burnt wounds by reason of the fire; (3) they are poisoned wounds because of the powder". This renders them very hard to cure, for while bruising and burning require moisture, a poisoned wound demands dryness; but the most important indication is to treat the poison. "Wherefore there is no better remedy than to use in the said wound an actual cautery, to touch all parts thereof, or to apply Egyptian ointment, as described by Avicenna. Also instead thereof a man may use a cauterisation of oil of elder boiling hot, for

this keepeth the wound from putrefying." Unfortunately this last suggestion was the one most widely adopted, till the authority of Vigo was superseded by that of Ambrose Paré.

NOTE.

For the venesection controversy see Brissotus, *Apologetica Disceptatio*, Paris, 1622; Delattre, *Essai sur l'Histoire de la Saignée*, Mayenne, 1886. The account of the Tübingen medical course is from Wunderlich, *Geschichte der Medicin*, appendix xxviii. The reader should compare it with that at Leipsic, given in Puschmann's *History of Medical Education*. The quotation from Vigo is from the English translation of his works, London, 1543.

XLIV.—THE MYSTICS.

THE revival of Greek learning and the discovery of the New World at the close of the fifteenth century produced an intellectual ferment in which the minds of men were singularly attracted by all things new and extravagant. The triumph of the Humanists over the Schoolmen brought with it the substitution of Plato for Aristotle, which, though in some sense an emancipation, left the way open for wild and vague speculation, and for a revival of that mystical Neoplatonism, the baleful effects of which upon medicine have already been noticed; and throughout the sixteenth century we find distinguished men devoting themselves to the serious study of such works as the Jewish Cabala, and the forged theosophic fragments attributed to Orpheus, Pythagoras, and Hermes Trismegistus. The results of this mysticism were manifested in general history by what has been well called the "witch mania," and in that of medicine by the extravagances of the astrologers and alchemists, and it is to the credit of the "Greeks," or "Hippocratic physicians" as they called themselves, that they vigorously opposed all three.

Passing over Dr. John Weyer and his crusade against the witch hunters, we may gather some interesting details

as to the astrological doctors from the *Medical Epistles* of John Lange, a pupil of Nicholas Leonicenus, and physician to four electors palatine (1485-1565). The doctrine that the heavenly bodies, and particularly the signs of the zodiac, exert an influence on the human frame, was held throughout the middle ages, and was especially favoured by the Arabist school of medicine; but it received its most extraordinary development from the mystics of the sixteenth century. Astrological calendars were compiled to show the proper days and seasons in which alone medicine could be given or venesection performed, and these were sometimes confirmed by the decrees of town councils, as at Bruges, where the barbers were forbidden to shave or bleed persons on the days marked dangerous in the "great and perpetual almanack" of Bruhesen (1550). Lange tells us that some of these calendars forbade any medicines to be given when the moon was in the signs of the ram, the bull, or the he-goat, for they are ruminating animals, and, according to Hermes Trismegistus, all medicine given at such times tends to return to the mouth. He adds that there was a tragic as well as a comic side to the superstition, "for it was thus that that promising youth, Peter Lemberg, lost his life. He was seized with an acute pleurisy, and the doctor recommended bleeding. Then came a runaway monk with an astrological calendar, who said the physician knew nothing, and that the patient could not be bled for three days, when the moon would be in the sign of the fishes. He died, however, the following evening. O vanitas vanitatum, et super omnia astrologorum vanitas!"

The astrologers also gave directions on higher matters such as the proper times for saying one's prayers, and their foremost representative Jerome Cardan seriously declared that 8 A.M. on the 1st of April was a peculiarly appropriate moment for offering petitions through the Blessed Virgin.

The chemical mystics, as they may be called, form a much more important class, and their influence on the healing art was far from being entirely unfavourable. They are represented in medical history by Basil Valentine, Paracelsus, and

Van Helmont, men whose relative fame is perhaps in inverse proportion to their actual merit. Of the first, we know only what can be gathered from his works, which were not published till a century after his death. He tells us he was a Benedictine monk, and legend connects him with the monastery at Erfurt, but no list of the order contains his name, which is probably an assumed one. Finding that the rule of St. Benedict still left leisure for the intrusion of idle thoughts, he began to study the secrets of Nature, in which he was much aided by ancient books contained in the monastery library. A brother monk had long suffered from a disease which baffled all physicians. In vain did Basil investigate the "anatomy" and extract the "quintessences" of numberless herbs during six years, till at last he turned to minerals, and found one of many colours, the "spirit" of which sufficed to cure the monk in a few days. For the rest of his life the grateful patient devoted an hour daily to special prayer for Basil, who, as the result of these and his own petitions, discovered many things hidden from those who think themselves wise and prudent. Nor is this boast unjustified, for the works of Basil Valentine contain the earliest mention of zinc and bismuth, of hydrochloric acid, sugar of lead, nitrate of mercury, and numerous salts of antimony, besides the modern methods of producing ammonia and sulphuric acid. By distilling this last substance with alcohol he obtained a pleasantly smelling liquid, which must have been ether, and which he recommends in many diseases. To Basil the great end of alchemy is the discovery of new remedies. Most chemists, he says, strive only after riches, caring nothing for their fellows, and thereby heap up judgment against themselves at the last day, but it would ill beseem a member of his sacred order to follow such examples, and his only object is to impart the knowledge of useful medicines to those who come after him. Mercury contains the highest arcanum of human health, and its spirit makes men and animals young like the eagle. The spirit of quicklime dissolves stone, and is a sovereign cure for gout. Valuable remedies may be

got from arsenic, nitre, copper, and lead, but the highest and noblest of drugs is the quintessence of antimony, which was specially created for the purification of mankind, and not only cures diseases, but rejoices the heart and increases chastity and piety. The physicians of his day, adds Basil, avoid chemistry because they are afraid of dirtying their hands and raising the price of soap, and he proceeds to attack them in language closely resembling that of Paracelsus, though somewhat less vigorous, "for I am a spiritual man, and bound by the rule of my order to have patience with all, or I could speak much more strongly". Had Basil's works been published when they were written, he would have been the founder of medical chemistry, an honour which has been usurped by Paracelsus, whose writings contain so exact a reproduction of Basil's theories, discoveries and even language that it is hardly possible to doubt that he had seen his predecessor's works in manuscript, and made extensive use of them.

NOTE.

Lange, *Medicinalium Epistolarum Miscellanea*, Basel, 1554; *Ep.*, 35. Henry of Mondeville speaking of applications for the removal of superfluous hair says: "Some one told me that they should only be used when the moon is in hairy signs. Now, hairy signs are the ram, bull, etc., and smooth signs are the crab, and the like thereof."

Jerome Cardan: see his interesting *Life* by Professor Morley, London, 1854. Cardan's importance in medical history has perhaps been exaggerated. He seems, in fact, to have been a sort of Italian Paracelsus, rendered ineffectual through lack of that coarse vigour which characterises the German. B. Valentine, *Chymische Schriften*, Hamburg, 1677. The mystery which enshrouds the form of Basil Valentine has led some to deny his very existence, and it has been suggested that his works are forgeries, written perhaps by Paracelsus himself or his pupils. Against this it may be urged that it is hard to see any reason for the supposed forgery, for a man who could write the *Currus Triumphalis Antimonii*, even at the end of the sixteenth century, had no cause to be ashamed of himself. Least of all is it conceivable that Paracelsus, could he have written such a work, would have hidden it beneath the cowl of an imaginary monk. On the other hand there certainly existed throughout the sixteenth century a widespread report of a German

monk who had composed wonderful works on chemistry, though the story that Maximilian I. ordered a special search to be made for them in 1515 is perhaps doubtful. That the connection between the writings of Basil and those of Paracelsus is more than accidental is unquestionable, and the accusation of plagiarism was brought against the latter as soon as they were published, by no one more directly than Van Helmont, who, writing of Basil, says: "Cujus doctrinam, suppresso auctoris nomine, in se rapuit Paracelsus".

XLV.—PARACELSUS.

THE most striking figure among the physicians of the sixteenth century, perhaps in the whole of medical history, is Theophrastus von Hohenheim, called Paracelsus (1493-1541), to whom his enemies in his lifetime, and his admirers of a later day, have given the title "Lutherus Medicorum". Biographical details may readily be found elsewhere, and space will only suffice for a brief consideration of the importance of Paracelsus in medical history, and of the system which he attempted to substitute for that of Galen. For Paracelsus did not, as is sometimes asserted, seek to divert the minds of his contemporaries from theory to observation and experiment, but rather to introduce theories and speculations of his own far more vague and contradictory than those they were intended to supplant.

He tells us that, after travelling through nearly all Europe, and investigating the art of healing as practised not only by physicians but also by surgeons, women, conjurers, alchemists, monks, and in the houses of rich and poor, he came to the conclusion that medicine is uncertain, varying, and worthless—in short, a delusion of evil spirits. He had determined to give up the study altogether when his eye fell upon the words of the Gospel—"They that are whole need not a physician, but they that are sick"—and his estimate of medicine was at once completely reversed. An art sanctioned by Christ Himself could have nothing to do with evil

spirits, but must, like all things which come from God, be certain, perfect and perpetual. Its practitioners, however, had gone hopelessly astray, and it was reserved for him (Paracelsus) to show them the right path. This he proceeded to do with an extravagance of conceit and virulence of abuse which soon produced their natural results—hatred and persecution.

The passages in which he exalts himself above all his predecessors and calls upon all his contemporaries to bow down to him are often quoted, but here are some less known instances. The *Lesser Surgery* possibly contains the substance of his first public lectures at Basel, 1527, which he inaugurated by burning the works of Galen and Avicenna. Its first chapter comprises a number of remedies for wounds, each of which, he declares, is better than the last, and any one of them worth all the Galenic medicines combined, and he concludes: "If I chose to compose a medicine of substances from divers regions beyond the sea, I would confound all your sects, books, and gallipots, and all your treasures amassed from the time of Adam unto this day, and I would reduce you to such a state that the dogs would pity you, that the very flies would disdain to sit on you, except to make their dirt".

The only ancient physicians he respects are Apollo (!), Machaon (!) and Hippocrates; as for Galen, "he cannot boast of a single experiment, but learnt everything from others. He opposes nature in all, and is therefore a liar who can do nothing but collect pearls and turn them into pebbles; wherefore he is in the lowest hell, whither his disciples will follow him." His own colleagues, he declares, are whited sepulchres, and there is no hope for the elder ones, who are like untrained old dogs, and can learn nothing; but for the benefit of the younger he will expound the true and divine medicine, which rests upon four "pillars" so firmly based that heaven and earth shall pass away before it perishes or disappears.

The first of these pillars is Philosophy, which Paracelsus

rates as highly as any ancient dogmatist: "Philosophy is the gate of medicine, and they who go not in thereat climb in by the roof and become thieves and murderers". This philosophy, however, is not that of Aristotle, which he compares to the froth and scum on the pot, containing perhaps some flavour of the broth, but fit only for dogs and cats; it comprises the whole circle of the sciences, physical and magical, especially the latter. An important division of it is "anatomy," not the dissection of bodies, which is a "boorish anatomy," practised by "Italian jugglers," and giving rise to nothing but error; but the "anatomy of the essence," an analysis, imaginary rather than chemical, of the intimate composition of man into its mystical ingredients, "salt," "sulphur," and "mercury," and the recognition of the "forms" of disease, with the corresponding "forms" of their remedies. Like the "philosophy" generally, this knowledge is acquired not so much by the intellect as by the illumination of the Holy Spirit.

The second pillar of medicine is Astronomy. "No one can be a good physician who is not skilled in astronomy." The stars, indeed, have no influence on human temperament or fate; Nero would have been a savage, and Helen an improper person, though there had been no such planets as Mars and Venus; in these respects a child's mother is its planet and star. But they do cause diseases by their exhalations, as, for instance, the sun by excessive heat, and it is no use trying to cure an astral disease while its star is in the ascendant. Therefore let physicians cease poking their noses into excrement, and lift up their eyes to the heavens, where they will find the fundamental principles of their art, and the path to true therapeutics.

The third pillar is Alchemy. "Without a perfect knowledge of alchemy the physician will use all the resources of his art in vain." Paracelsus classes here all attempts to improve natural substances. Thus the baker and weaver are alchemists; but its great use in medicine is to separate the quintessences of drugs, a foreshadowing of the modern search

for "active principles". An alchemist, or "archeus," resides in the human stomach and presides over digestion, separating the poisonous from the nutritious part of the food, and when a human alchemist has attained similar skill he will be perfect in his art.

The fourth pillar is the Virtue of the physician; for the virtuous only are permitted to penetrate into the innermost nature of man and the universe, a power possessed in great perfection by Paracelsus, but found in very few besides, even among his own pupils, only ten in some hundreds of whom, he says, were at all satisfactory.

Man, according to Paracelsus, is a microcosm—that is, he contains elements representing every part of the universe. "There is nothing in heaven and earth which is not in man, and God, who is in heaven, is also in man." Diseases are caused and cured by the action of the various constituents of the universe (the macrocosm) on their corresponding parts in man (the microcosm), from which it follows that the physician must take all knowledge as his province, and that medicine is the highest and widest of sciences since it includes them all from theology downwards. Elsewhere he distinguishes five "Beings" (Entia) which are the causes of all diseases, and each of which can produce any disease, there being thus five kinds of jaundice, five kinds of dropsy, and so on. "When a physician, therefore, finds himself in the presence of a paralytic, he must, before all things, discover which 'Ens' has produced the paralysis." The first four are the "Ens Astrorum," or influence of the stars; the "Ens Veneni," or poison; the "Ens Naturale," or disturbances arising in the body itself; and the "Ens Spirituale," or spiritual agencies.

The Ens Astrorum has been considered under astronomy, and the Ens Veneni will be discussed when we speak of his doctrine of "tartar," but the spiritual agencies deserve a special notice. These, he declares, have nothing to do with angels or devils, whom he leaves to theologians, but are the spirits of human beings. They are not identical with the soul, "nor is this spirit given from heaven; but

LANE MEDICAL LIBRARY
STANFORD UNIVERSITY
MEDICAL CENTER
STANFORD, CALIF. 94305

man makes it himself, it is the child of his will". Children have no spirits, for they have no perfect will. The spirits may leave the body of their possessor with or without his consciousness; they can be seen and felt by other spirits, and can assist or injure one another. A free fight (*freyer kampff*) may take place between two such spirits, as a result of which, wounds, ulcers and diseases may appear in the bodies of their owners. Paracelsus supports this by what he calls the undoubted fact that witches can imprison the spirits of their enemies in wax figures: also the spirits of a fugitive thief may be forced into a wax figure, and all that is done to it will be felt by the thief. This cannot be done to an honest man for his spirit resists; but a thief's spirit is cowardly, as is shown by his running away. "And think not that this is a joke, ye physicians; ye know not the least part of the power of the will, for she bears spirits quite distinct from the rational spirit."

But after carefully describing and distinguishing these four "Entia," Paracelsus tells us that all this applies only to Turks, Saracens, and other infidels, and has been written mainly to sharpen the reader's "ingenium"; for Christians and Jews there is but one cause of sickness, the "Ens Dei," or direct action of God, who sends diseases as purgatorial punishments. When the predestined hour of release comes, He either cures the patient directly, or through a physician, most of whom, however, resemble the demons of purgatory, and are sent to increase the torments of the sick.

The immediate causes of disease are changes, not in the four humours, but in the three mystic elements, salt, sulphur, and mercury. "What burns is sulphur, what smokes or sublimes is mercury, the ashes are salt." In health these are so mingled in the body that they cannot be distinguished; when they separate they cause sickness; their complete separation is death. Thus distilled "mercury" produces paralysis, precipitated gout, sublimated mania. Prurigo and scabies are due to a solution, ulcers to a calcination of the "salt". This doctrine is obviously a mere reproduction

of the humoral pathology in a vaguer form. We know what blood, phlegm and bile are, and may therefore hope to discover their relation to diseases; but the Paracelsic "salt," "sulphur" and "mercury" are mystical terms which may mean anything.

The above is a brief outline of the general medical doctrines of Paracelsus, but his habit of self-contradiction, and of insisting on each separate point as the one thing needful, renders it very difficult to form a consistent idea of his teaching. This also helps to explain the opposing verdicts which have been passed upon him. It would be easy, for instance, by confining ourselves to special passages, to hold up Paracelsus as the benefactor if not the reformer of medicine; but it would be still easier, by quoting his more extravagant theories, to apparently justify the exclamation of an opponent: "Who can take up a treatise by Theophrastus without at once seeing that the man was mad!" His modern admirers belong to two very different classes: German medical historians, in search of some one to rival the fame of Harvey and the great French and Italian surgeons and anatomists; and theosophists anxious to show what benefits have been bestowed on mankind by the great adepts or Mahatmas. They have raised an imposing monument to their hero on somewhat slight foundations. Does Paracelsus abuse Galen and Avicenna? He is "the reformer of medicine!" Does he say that air is contained in water? He is "the immortal discoverer of hydrogen!" Did he call one of his secret nostrums "laudanum"? "He bestowed on mankind the inestimable gift of opium!" The historians indeed admit that if he wrote all the absurdities attributed to him, he cannot be the reformer of medicine, the German Harvey; and they attempt to show that most of his so called works are spurious, and written by crackbrained pupils, or even by his enemies to bring him into ridicule. But it is just these works which excite the admiration of our modern mystics. Paracelsus, say they, in his leisure moments, doubtless reformed medi-

cine, discovered hydrogen, and invented laudanum, but it is in what you call absurdities that we recognise the language of the great adept, the friend of the Khan of Tartary, who conversed with esoteric Buddhists on the northern slopes of the Himalaya. Neither the biblio nor biographical question can be considered here, but after a short account of Paracelsus' doctrine on some special points, and particularly on the treatment of disease, we shall attempt to form an impartial estimate of his real position in medical history.

NOTES.

The title Philippus Aureolus Theophrastus Paracelsus Bombast von Hohenheim is never employed by himself, and is mostly used by his enemies, who considered such a name in itself a proof of quackery. The only evidence for Philip is his tombstone, where it may be a later addition, and a single letter of doubtful authenticity. He uses the term "Aureolus" when comparing himself with Theophrastus, the pupil of Aristotle, he (Paracelsus) is a very different man, a "golden" Theophrastus. It is probably one of those euphonious pseudonyms so common in that age. Bombast was part of the family name of the Hohenheims, and, in spite of some scandal to the contrary, Paracelsus seems to have a legitimate claim to it. It has no connection, except through the irony of fate, with the English word for inflated language. Though he doubtless considered himself "superior to Celsus" his usual title is probably intended for a translation of "Von Hohenheim" for his pupil Bodenstein describes him as "e familiâ Paracelsorum".

For an explanation and refutation of the hydrogen myth see Kopp's treatise on the discovery of the compound nature of water in his *Beiträge zur Geschichte der Chemie*, Brunswick, 1869-75. The nature of the laudanum is discussed in Ap. vi. Paracelsus' visit to Tartary rests on the evidence of Van Helmont, who connects it with the legend of his mutilation. It seems sufficiently disproved by the fact that Paracelsus makes no mention of it in the two lists he gives of the countries he has visited, while in the *De Morbo Tartarico*, cap. ii. he distinctly denies that he has ever been in Asia or Africa: "Dass ich Asiam und Aphricam erfahren hab und dieselbigen Blätter umbkert ist nit".

Nearly 300 treatises have been attributed to Paracelsus, of which about 100 are printed in the collected editions, Basel, 1589-90, Strassburg, 1603-16, and Geneva, 1658 (Latin trans.). Of these Haeser considers fifteen, Marx ten, and Rohlfs five or six to be genuine. See *Haeser*, ii. 83, where may be found a copious list of the "Paracelsus Literature"

up to 1870. Since then the chief works on the subject are Mook, *Theophrastus Paracelsus*, Wurzburg, 1876, severely criticised by Rohlfs, *Archiv*, 1882; Schubert, *Paracelsus Forschungen*, Frankfort, 1887; Ferguson, *Bibliographia Paracelsica*, Glasgow, three parts, 1877-90; Hartmann, *Paracelsus*, London, 1887 (from an "esoteric Buddhist" standpoint).

XLVI.—PARACELSUS (*continued*).

ACCORDING to Paracelsus the physicians of his day wasted their time disputing with peasants and laymen, and neglected "philosophy," which would have taught them the doctrine of "tartar," and its coagulation by the "spirit of salt," "a far better anatomy than the cutting up of robbers and such like, for the young new-fledged fools when they have seen it all know less than before, and choke themselves in dirt and carcases". All food contains poisonous, as well as nutritious ingredients, and it is the business of the alchemist or Archeus of digestion to separate the two. If he fails to do this, or if the excretory organs are damaged, the poison remains in the body, and there meets with a "spirit of coagulation," which solidifies and causes it to be deposited on the teeth, in the joints, and in various other organs. This deposit Paracelsus calls "tartar," partly because of its resemblance to that found in wine casks, and partly because the pains it causes are like those of Tartarus. Numerous "tartaric diseases" are thus produced, the chief being gout and stone, which are closely allied, and the tendency to which may be inherited. This doctrine of tartar is one of the most highly-praised parts of the Paracelsic system, but though it contains much that is true there is little that is new, as Paracelsus might have learnt had he read his Galen instead of burning him.

Still more excellent is his teaching as to the healing of wounds. Every part of the body, he says, contains a natural "balsam" capable of curing injuries, and nothing more is required than some simple ointment to serve as a nutriment

to this balsam, and dressings to protect it from "elementary powers hostile to nature". Here, one might say, is the Hunterian doctrine of plastic lymph, and the modern theory of antisepsis in a single sentence. The hostile powers of the air may indeed be considered a poetic anticipation of micro-organisms, but the rest of the sentence is to be found in, and was probably copied from, the writings of Basil Valentine.

In Paracelsus the belief in the healing power of nature is overshadowed by his faith in the efficacy of drugs. Every disease has its specific remedy or "arcanum," and is only incurable because of the ignorance of physicians. Those who say that leprosy is incurable are not only ignorant but impious, for did not Christ specially command His disciples to heal lepers? He applies the same principles to surgery, "which requires more physic than all internal diseases". Operations, with the possible exception of lithotomy, are barbarous, and it should be the surgeon's great object to discover the infallible arcana which cure all diseases, surgical as well as medical. It is thus that Paracelsus arrives at his highly praised, though by no means original assertion that surgery and medicine are one, but it is obvious that, had such doctrines been accepted, they would have reduced the former art to a mere caricature of the latter.

Magnetism has always been an attractive subject for the mystics, and the power of the load-stone, "which traverses many thousand miles to its polar star," is adduced by Basil Valentine to prove that the curative influence of sympathetic ointments applied to the blood which has flowed from, or the weapon which has inflicted, a wound is carried to it through the air, and will undoubtedly heal it. Paracelsus repeats this, and adds a discovery of his own, *viz.*, that magnets properly applied will check all abnormal discharges, bleeding, etc., and will also cure epilepsy and tetanus, for which purpose four magnets must be fastened to the four extremities, and then the proper medicines be given. "And this paragraph is worth more than all the humoralists have written or taught in all the schools from their first day until now."

In the choice of drugs Paracelsus relies mainly on the doctrine of signatures: "As a woman is known by her shape, so the medicines," and the nature of the arcanum, is recognised by the form, and especially by the colour, "tincture," of the substances containing it. Thus the topaz and the juice of the celandine are useful in jaundice, but yellow substances are also beneficial in heart disease, yellow being the colour of the sun, which rules that organ, and to distinguish which the physician must acquire the knowledge of philosophy, astronomy, and alchemy above mentioned. In one passage Paracelsus asserts that the action of a remedy depends not on its amount, but on the virtue of the arcanum, which he compares to a spark, but elsewhere he says that the dose must be regulated by the quantity (*copia*) of the disease, for when these are equivalent "nature at once cures that which is contrary to it".

Simplicity in prescribing is the natural result of the doctrine of specifics, and Paracelsus' attack on the complicated mixtures of his contemporaries is one of his best claims to the title of reformer. "Which are the best breeches? Those which are whole; the patched are the worst." His claims to be the introducer of new, and particularly of chemical, remedies, are very questionable. The recommendation of antimony, round which the contests between the Galenists and "chemists" specially centred, seems to have been taken almost *verbatim* from Basil Valentine. Mercury and opium were used long before his time, and there is no reason to believe that the arcanum which Paracelsus called "laudanum" had anything to do with the preparation so named by Sydenham. But if it may be questioned whether Paracelsus disproved any part of the Galenic system, or introduced a single new truth into medicine, the controversies which raged round his doctrines doubtless assisted in overthrowing the old theories; and though his attack consisted chiefly in noisy declamation, with occasional happy hits, it is these which most influence the vulgar, among whom discarded medical theories tend to

linger longest. The walls of the Galenic Jericho were tottering with age, and were already undermined by the knife of the anatomist, but it may also have been necessary that some one should blow the trumpet, and we may admit that Paracelsus blew vigorously.

More space has been devoted to Paracelsus than he probably deserves, and the judgment has been an unfavorable one; but if some things are omitted which are to his credit, we have passed over far more of his absurdities. His admirers praise his wonderful strength of mind in breaking with the old traditions. It may, indeed, excite our admiration when a man like Vesalius stakes his reputation and livelihood on the truths of facts denied by nearly all his fellows, and triumphantly demonstrates them; but what sort of mind is required for the assertion that all one's predecessors were consummate idiots, and for the declamation of mystical theories as incapable of disproof as the existence of ghosts or Mahatmas, may be left to the admirers of Paracelsus to determine. There can be no temptation to judge harshly now one who was harshly judged in his lifetime, but when the notorious German is placed above Harvey, and Vesalius, and by the side of Hippocrates, we may at least attempt to dislodge him, and to reduce him to his proper level—not, indeed, that of a mere drunken quack, but below Harvey, below Vesalius, and below the man whom he robbed in the dark, the unknown monk of Erfurt who called himself Basil Valentine.

It is impossible to overlook the close analogy between Paracelsus and Hahnemann, seen both in the men and in their doctrines. There is the same sudden reaction from scepticism to infallibility; the same overweening self-confidence and indiscriminate abuse of others; the same theory of specifics based on the idea that God must have created remedies for every disease, but has concealed them in a sort of puzzle, the solution of which establishes a new and divine medicine in place of the old and false one, to advance which so many great men have for ages laboured in vain; even the

supposed keys to the puzzle are in many respects similar. And we may trace a like resemblance from the historic standpoint. Though medicine may have in some degree profited from the controversies raised by Paracelsus and Hahnemann, neither can rightly be called a reformer. It was not Paracelsus, but Harvey, and the great anatomists whom he so despised, who overthrew Galenism; it was not Hahnemann, but the great pathologists and clinicians, Morgagni, Bichat, Laennec, who finally delivered us from schools and systems altogether, and introduced a new epoch of scientific medicine. The triumph of either would have been little less than disastrous: that of Paracelsus would have substituted for Galenism a new system more difficult to overthrow, because less in contact with facts; that of Hahnemann would have formed an almost fatal hindrance to the progressive development which marks the medicine of the present century.

NOTES.

Though Paracelsus talks much of simplicity in medicines, the specimens of his prescriptions which have come down to us are no less complicated than those of his opponents. Indeed the more one studies his works, the harder it is to find any justification for the title "reformer of medicine" given him by some German writers and their English copyists. By their fruits ye shall know them. Where were the centres of medical activity and progress during the latter part of the sixteenth century? In Germany among the Paracelsists? No, but in Italy and France, among the great anatomists on whom he poured the vials of his abuse, and the great surgeons whose art he would have brought down to a mixture of drugging and drivelling superstition. In the century succeeding the death of Paracelsus, only two German practitioners are noticeable from the view of general medical history; the distinguished surgeon, Fabricius Hildanus, and the great chemist and physician, Andrew Libavius, both of whom were sturdy opponents of the Paracelsists.

The above outline of the medical doctrines of Paracelsus is based upon the *Paramirum*, the *Paragranum*, and the *Great Surgery*, works which are usually admitted to be genuine. The treatises quoted in the following chapter are very doubtful, but are not to be omitted on that account, for "Paracelsus" is represented in medical history by all

the works which were generally believed to be by him, not merely by those whose authenticity may survive the abstruse researches of the latest learned German.

XLVII.—SIMILARS, SYMPATHY, AND SIGNATURES.

WE may conveniently pause here to consider three important and closely-allied medical doctrines, first clearly formulated by Basil Valentine and Paracelsus, those of "similars," "sympathy," and "signatures." The germ of these theories may be seen in such primitive beliefs as that the sight of a yellow bird will cure jaundice, and in the ancient legend of the spear of Achilles, which healed the wounds it inflicted. The use of similars had been sanctioned in special cases by Hippocrates, and is, indeed, a natural result of his doctrine of the "vis medicatrix," for if some symptoms in disease are due to the efforts of Nature towards a cure, it is the physician's obvious duty to assist those efforts by means of drugs which produce similar symptoms. Analogous theories may be traced throughout the Middle Ages both among Arabs and Christians. Thus the free-thinking philosopher, Averroës, writes (*Colliget* v. 19): "Nature has so arranged that diseased organs are benefited by parts similar to them, *e.g.*, in disorders of the stomach the stomachs of animals are commended, especially those of fowls, and for a diseased lung, the lungs of animals, especially foxes". So, too, the blessed Albertus Magnus tells us: "It is no secret how every 'like' aids confirms, loves, acts upon, and embraces that which is like it ('quomodo omne simile adjuvet et confirmet suum simile, diligat et moveat et amplectatur illud'). And the physicians have already asserted and verified this for their part, for they declare that liver is good for the liver, and every organ for its like." Arnald of Villanova recommends that all soldiers wounded in battle should drink a decoction of persicaria or water-pepper, and that a powder

of the same should be sprinkled on the wound, a prescription apparently based on the fact that the plant has a reddish stalk and flower, and leaves spotted, as it were, with blood. These, at least, are the reasons adduced by Paracelsus, who repeats the recommendation. Similarly the leaves of the asarum and the cyclamen were supposed to resemble the human ear, and preparations of those plants were, as we have seen, prescribed in aural diseases by the most distinguished and orthodox practitioners.

But it was the medical mystics who first converted these beliefs into fundamental principles of practice, for they combined in their philosophy two doctrines which especially favoured them—the Neoplatonic theory that the human body has a mysterious correspondence and sympathy with the outer world, is in fact a little universe or microcosm, and the Christian dogma that all things were created with a view to mankind. In one of her visions St. Hildegard heard a voice from heaven which told her that man contains in his body the images or signatures of all things, and in her medical writings she declares that the fact that the mole casts out the bad earth from its burrow in heaps is a sign that the animal when boiled, or dried and powdered, will expel evil humours from the body and cure scrofulous swellings, with much else of a similar nature. Basil Valentine, however, is led to his doctrine of similars chiefly by his anxiety to prove that poisons are medicines. They were created for man; they certainly are not good for the healthy, therefore they are good for the sick. Disease may be likened to a poison which may either be driven out by contraries or drawn out by similars, and the latter is by far the best method and causes least disturbance. He supports this theory by many arguments and examples. It is well known, he says, that if a venomous toad be dried and powdered, and the powder sprinkled on a poisoned wound, it will draw out the poison as a magnet draws iron, and the wound will heal. Soap is a fat which has been treated chemically, and has thereby acquired the power of extracting

fat stains from linen; similarly, antimony is a poison, but if treated chemically it will acquire the power of drawing out poisons from the human body, or, in other words, of curing disease. It is interesting to find Paracelsus using exactly the same analogy, in almost the same words, to support his doctrine of *similia similibus* (*Manuale de Lapide Philosophorum*).

But the doctrine of Paracelsus may, perhaps, be more correctly expressed by *analoga analogis*. The Galenic theory of contraries, or of treating hot by cold, etc., he declares is, and always has been, false; the true opposition is between the disease and the arcanum, or remedy which corresponds to it. These he compares to two combatants who are alike hot or cold, and armed with similar weapons, defensive and offensive, "for it is thus that Nature wills her battles should be fought". "So heart cures heart, spleen spleen, lungs lungs; not sow's heart, not cow's spleen, not goat's lungs, but member to corresponding member of the great and the inner man (*i.e.*, the macrocosm and the microcosm)." These correspondencies are shown by signs or signatures, especially in colour. "If a plant has a flower of two colours it has two virtues; if three, three, etc." The spines of the thistle indicate that a decoction of that herb is good for pains in the side; persicaria, for the reasons given above, is the remedy for bleeding wounds; but the leaves and kernels of the peach-tree are also useful, "for see now on the fruit of the peach, if it is pressed by the finger, hollow places remain, so also severe wounds leave hollow places behind them". Lizards are good for anthrax or carbuncle, as is proved by their colour, and the frog is a specific for plague. "Why is the frog so strangely made except that he should be a medicine for the plague? Therefore he has his signature thereto; for see as disgusting (*abscheulich*) as is the plague, so disgusting is the frog also. When a plague is coming frogs have black spots on their tongues: also so many frogs as sit upon one another at an unusual time, *e.g.*, ten or twenty upon one another, show how many human beings

shall be thrown upon one another in one grave. For signatures are to be sought, not only in shape and colour, but also in actions." Paracelsus proceeds, with his usual strength of language, to declare that those who profanely doubt this make God a liar, for it is He who creates medicines out of the earth, and marks them so that we may recognise their uses (*Von der Pestilenz I.*).

Basil Valentine was a man of far more sober and scientific mind than Paracelsus, but the following example shows to what depths of absurdity even he could be brought by the spirit of mysticism. Lead, in the language of alchemy, corresponds to Saturn, the slow-moving melancholy planet. Therefore, according to Basil, the salts of lead will attract to themselves by sympathy the humours which cause melancholia, and so cure that disorder. Such theories were considered by the mystics peculiarly profound glimpses into the secrets of Nature, and the less they were connected with common-sense, the more they were held to be due to some semi-divine revelation, and the more vigorously did they abuse those who rejected them.

The special interest of the sympathetic ointment, and the great names with which it is connected will justify a somewhat detailed account. Though mentioned by Basil Valentine, its origin was universally ascribed to Paracelsus, and the first published description of it is the following passage from his *Archidoxis Magica*. "Sympathy does much in human affairs. Take of moss growing on a skull exposed to the weather, and of human fat each two oz., of mumia and human blood each half an oz., oil of roses, bole armeniac each one oz., linseed oil two drachms. Make an ointment, and preserve in a box. When you have to treat a wound, simply dip a splinter of wood in the blood, and when dry stick the wood in the ointment. Bandage the wound every morning with a new cloth soaked in the patient's urine. So it will heal without any other application, and you may thus cure a patient ten or twenty miles off, if you only have his blood. (Toothache may be treated

similarly, also a horse which has been badly shod—*vernagelt.*) These are all wonders and gifts of God. Also if you have a weapon with which a man has been wounded and anoint it with a certain ointment, the wound will heal without pain. The ointment is the same as the former, but you also take of beef fat 1 drachm, honey 1 oz. Since, however, one cannot always get the weapon the wood plan is better." Baptista Porta asserts on the authority of a courtier (*Magica Naturalis*, viii. 12) that Paracelsus imparted this remedy to Maximilian I. who valued it highly. If so he must have invented it in his youth, for Kaiser Max died 1519. Jerome Cardan writing about 1568 says: "It is reported (*vulgatum fama est*) that if a weapon with which a man has been wounded is exposed to the air the patient suffers severe pain, and on the other hand, that there is an ointment which, when applied to the weapon will relieve the patient as much as if an effectual remedy had been placed on the wound. And to confirm this they add a description of the ointment which consists of frankincense, saffron, myrrh, bdellium, human fat (or at least bone), sarcocolla, aloes, centaury, resin, elemi, styrax, pæony root, panax, pitch, iris, verbena, betony, coccus (?), red cabbage, ozimus, elm leaves, sycamore juice, dregs of the bath (*balnei sordes*) wine, honey, and salt, —but some say there are only fourteen ingredients" (*De Venenis*, ii 6.).

During the latter part of the century the sympathetic ointment was widely used, especially by amateur practitioners and the disciples of Paracelsus, and in 1592 the great chemist and physician, Andrew Libavius, published a special treatise *Against the Paracelsic Imposture of the Weapon Salve*, which, as the following extracts will show, could even now hardly be improved upon: "While at Jena (1588) my attention was directed to the weapon salve by an illustrious and widely celebrated man there, who firmly believed in it. I argued that wounds are cured by nature and that the ceremony is an imposture, or done to encourage the patient and gain his confidence, though it may also be of use by direct-

ing the natural forces to the spot through the imagination, and by preventing improper applications: for how much harm these may do is known only too well." "Another man informed me that Paracelsus appeared to him in a dream and told him to treat wounds by applying persicaria to them and then burying it. As it decayed the wounds would heal. And he said he had proved this by many cures. I replied: 'You are deceived by your superstition, and are yourself a deceiver of others, for that is no proof at all'". Nature does quite as much without any such absurdities: "A carpenter's boy accidentally cut off the tip of his little finger. His very fright prevented much bleeding, so he picked up the piece, reapplied it, and then anointed it with some hot glue which happened to be near, and put on a bandage. In three weeks the parts were perfectly reunited. Here no weapon salve was used. I myself while visiting a friend, was carving a ham and cut my left thumb to the bone, so that it bled furiously. I sprinkled the wound with sugar, and bandaged it (without anointing the carving knife), and with that single dressing, it healed completely in a short time. These cases are quite as marvellous as any the weapon doctors can show."

But in spite of the vigour and ability of this attack, the superstition still flourished, and even so excellent a surgeon as Fabricius Hildanus is disposed to believe in it: "In 1613, the Lady Anna Sidonia Bremserina of Rüdesheim on Rhine, having happily recovered from child-birth, was somehow wounded in the left breast by a knife. Her friends, leaving the wound to itself, diligently anointed and bandaged the knife. The wound healed rapidly on the surface, but was followed by an abscess and severe febrile symptoms, which so frightened her relations that they sent for me." Fabricius treated the abscess by free incision and she recovered. In this case, he observes, the weapon salve may be said to have failed; but he explains the failure by saying that it was generally believed to have been revealed to Paracelsus by the devil, and the patient was a lady of such singular piety that nothing devilish could have any effect on her. That the

sympathetic cure was allied to witchcraft was the view taken by most of its opponents, and it was a pamphlet maintaining this theory published by the Jesuit, Robert, in 1615, which called forth the ablest and most unfortunate of its defenders, J. B. van Helmont. Van Helmont had already offended a large part of his own profession, and he now went out of his way to attack a more powerful class. In his *Disputatio de Magnetica Vulnerum Naturali et Legitima Curatione,* he remarks that when theologians go beyond their last (*ultra crepidam*) they invariably make themselves ridiculous. "What marvel if a theologian knows nothing of this matter. For after the priest and the Levite had gone to Jericho, came the layman, the Samaritan, who has taken from the priests all right of inquiring into natural things. Nature therefore has thenceforth not called the theologians as her interpreters, but has adopted the physicians as her sons." He then proceeds to provide his opponents with weapons against himself. Basil Valentine, in wholesome dread of the witch-hunters, had declared that the sympathetic ointment comprises nothing magical or contrary to Holy Scripture, but acts through natural forces allied to those of the magnet, and this Van Helmont is careful to repeat. But the narrow path of orthodoxy is bordered by pit-falls on the right hand as well as on the left, and Helmont goes on to assert that the cures wrought by the relics of saints and certain images are also not truly supernatural, but are due partly to the faith of the patients, and partly to a magnetic influence similar to that of the famous ointment. His book was therefore assailed both by physicians and theologians, and the latter discovered in it twenty-seven heretical propositions, of which the above exegesis of the parable of the Samaritan was the twenty-first. It was in vain that Van Helmont professed his readiness to recant all his errors, to suppress and burn his book, and to believe everything which the Holy Catholic and Roman Church had declared to be matters of faith. He was arrested 4th March, 1634, by order of the Procurator of the holy office at Malines, and

after a short imprisonment in a convent, was strictly confined to his own house for four years, nor was he finally reconciled to the Church till some time after his death.

The oft told story of Sir Kenelm Digby and his "powder of sympathy" need not be repeated here. It merely represents a final episode of the superstition, and contains nothing original, for Van Helmont had already declared that "calcanthos" or a mixture of the sulphates of copper and iron (which seems to have been the powder used by Digby) was quite as effective as the horrible mess prescribed by Paracelsus.

NOTES.

The various treatises on the sympathetic ointment are collected in the *Theatrum Sympatheticum Auctum*, Nuremberg, 1662. See also Gangloff, *Disputatio de Sympathia*, Jena, 1667; Libavius, *Tractatus duo Physici*, Frankfort, 1594; Brœckx, *Interrogatoires du Dr. J. B. van Helmont sur le Magnetism Animal*, Antwerp, 1856.

XLVIII.—THE GREAT ANATOMISTS.

THOUGH the intellectual revival, which, during the fifteenth and sixteenth centuries, produced such great results in art, literature, and religion, was slow in effecting a revolution in medicine, the activity in other directions had important influences on the healing art. We have already seen how the study of classical literature gave rise to a Greek, as opposed to the dominant Greco-Arabic, school of physicians, whose controversies lasted more than a century, and how the rejection of authority in religion coincided with the appearance of medical anarchists and freethinkers, of whom Paracelsus was the chief. The renaissance of art was not without stimulating effects upon another form of activity in medicine, less noisy and conspicuous, but destined to produce far greater and more permanent results.

Two centuries had elapsed since Mondino of Bologna

"restored" anatomy, but hardly any progress had been made. Bodies were opened rather than dissected, and little more was done than to point out how the position of the viscera corresponded with the descriptions of Galen. The requirements of the great artists, Leonardo-da-Vinci, Raphael, Michael Angelo, demanded something more than this, and when, in 1521, Berengar of Carpi, Professor at Bologna, published a commentary on his predecessor's work, intended for artists as well as physicians, and calling in question assertions not only of Mondino, but of Galen himself, he inaugurated a new era—that of the great anatomists. Space will not permit the enumeration of the various discoveries attributed to each of the distinguished men to be now briefly mentioned, nor are such lists of much historical value; the two facts important to notice are the gradual undermining of the Galenic infallibility, and the anatomical preparation for Harvey's great discovery. Berengar did something in this direction by carefully describing the structure and valves of the heart; but the real beginner of the work was Andrew Vesalius, born at Brussels, 1514; professor at Padua 1537-46, while he taught also at Bologna and Pisa; died 1564, shipwrecked on the Island of Zante. Why is Vesalius the greatest of anatomists? Not because of the facts he discovered, for in these he was equalled, if not surpassed, by Eustachius and Fallopius; but because he first saw that it was useless to continue commenting upon or correcting Galen and Mondino, and that anatomy must begin afresh; and because he made this fresh beginning, as well as any single man could make it, in his immortal work *On the Structure of the Human Body*, published 1543, when he was only twenty-nine years old. The importance of this work is best seen in the attacks of the Galenists, especially of his master, Sylvius, who called him "a madman (*vesanus*), whose pestilential breath poisons Europe"; in the admiration of such men as Fallopius and Paré; and, above all, in the impulse which it gave to the study of anatomy. A few years after its publication the professorial chairs of the

universities of Italy were filled with men whose names are daily repeated in every dissecting room. Vesalius, indeed, had gone, leaving his work at Padua to his prosector Columbus, who declared that there was more to be learnt from dissecting, and especially from vivisecting one animal, than from reading all the anatomy of Galen or feeling pulses for months, and whose zeal was rewarded by the discovery of the pulmonary circulation. The ancient fame of Bologna was well supported by Arantius and Varolius. Vidius had returned from establishing the anatomical school at Paris to teach at Pisa. Eustachius was at Rome, Ingrassias at Naples, and in 1551 the combined professorships of anatomy, surgery and botany at Padua were undertaken by one who, in the beauty of his personal character as well as in the amount and excellence of the work accomplished during his short life, stands first of Italian anatomists—Gabriel Fallopius (1523-62).

The fame of the new anatomy soon crossed the Alps, and Padua especially became a sort of Mecca for ambitious medical students of every nation, insomuch that when Harvey went there, 1598, it was considered a bad year if less than 1000 new pupils matriculated. They each paid 100 gold ducats yearly, a sum which enabled large salaries to be given to the 100 professors, especially those of the medical faculty. Thus the professor of practical medicine received 3000 florins a year. Jerome Fabricius, Harvey's tutor in anatomy, was paid 1100, while Galileo, though his salary was twice raised as a special honour, never got more than 1000.

The state of the science in the Teutonic countries presents a marked contrast to the above. In Germany, where Paracelsus is supposed to have reformed medicine, professors continued to lecture in the old style on Galen and Avicenna, to students hardly more numerous than themselves. England had for the first time produced in Linacre and Caius medical teachers of European reputation, and the anatomical work of Vicary, though from a wider standpoint it can hardly be considered more than a parody on the new

science, was, at least, a promise of greater things to come. But the only country which could in any way compare with Italy, was France. When the Collège de France was established in 1530 they sent for Guido Guidi from Florence to organise the medical faculty, and he did so with a rapidity and success which caused the wits of the age to declare that *Vidus Vidius venit, vidit, vicit.* He left the continuation of his work to Jacques Dubois (Sylvius) of Amiens, a teacher of men greater than himself—Vesalius, Servetus, Etienne—to whom, however, though the friend of Galen rather than of truth, anatomy is indebted for much of its nomenclature. He chiefly dissected animals, perhaps from the difficulty of obtaining human subjects, which compelled Vesalius to rob the gallows, and the gentle and pious Rondelet to inaugurate his anatomical theatre at Montpellier by dissecting the body of one of his own children.

The history of the discovery of the valves in the veins is of special interest and importance. Dr. Willis in his *Life of Harvey*, attributes it to Sylvius (*Isagoge*, Venice, 1536); most French writers give the credit to Etienne, 1545; Sprengel, Haeser, and the Germans generally, ascribe the discovery to Canani, 1546; while Harvey's tutor, Fabricius of Aquapendente, claims the honour for himself, 1574. There is no doubt that Sylvius mentions the valves in his *Isagoge.* They are found he says, in the vena azygos, the jugulars, brachials, femorals, and the trunk of the vena cava where it leaves the liver, and they resemble in form and function those at the origin of the great vessels of the heart. But the *Isagoge* was first published in 1555; there was an edition at Venice in the following year, and Dr. Willis was perhaps deceived by a misprint. Sylvius, however, may very possibly have noticed the valves as early as 1536, and his pupil Etienne not improbably borrowed from him the assertion that there are valves in the hepatic veins which prevent the regurgitation of the blood. There are, of course, no such valves in man, though they are said to exist in some animals. The claim of Canani rests on the evidence of his contem-

poraries. Amatus Lusitanus observes (i. 52): "If you put a tube in the upper part of the vena cava and blow downwards, both the vena cava and the azygos will be inflated; but if you blow into the lower part of the vena azygos the air will not pass into the cava because of a valve and operculum which exists at their junction. And there is not the least doubt of this for I have proved it a thousand times. For in 1547 at Ferrara I caused twelve bodies of men and animals to be dissected, and both I and a great company of learned spectators saw that all happened as described. As also was observed by that admirable anatomist, J. B. Canani." Fallopius, writing to Vesalius, 1562, says that he could find no such valves. "Nor is Canani such a fool (*neque ita ineptus est Cannanus*) that he could not easily have seen the large and patent opening between the vena azygos and vena cava," and he concludes that either Amatus made a strange error, or that Canani was having a joke at his expense. To this Vesalius replies: "Whether you think Canani was amusing himself at my expense, as well as that of Amatus, I know not. For when I met him in consultation at Ratisbon on the case of Francis of Este, he told me he had seen valves in the vena azygos, in the renal veins, and at the bifurcation of the vena cava near the promontory of the sacrum, resembling in shape those of the aorta, and pulmonary artery, and serving to hinder reflux of blood." Vesalius determined to verify this on the first opportunity, but failed to find them "*Has namque non reperi*, but there is a certain thickness and swelling (*extuberantiam*) at the orifices of the veins, which, I suppose, they have mistaken for valves." As a matter of fact there usually are valves in this position, but they are rarely effective. When they are effective, they act in a way exactly the reverse of that concluded by Amatus from his "thousand experiments". Vesalius was at Ratisbon in 1546.

In 1565 Eustachius described and figured the valve at the end of the coronary vein of the heart. Columbus, 1559, declared that there are valves in the mesenteric veins per-

mitting fluid to enter from the intestine, but preventing its regurgitation. Had he discovered the valves of the lacteals? Posthius, a pupil of Rondelet, commenting upon this in 1592, says there are no valves in the mesenteric veins, but very large and distinct ones in the femoral. Finally Fabricius published his treatise *De Venarum Ostiolis* in 1603, with beautiful illustrations of the valves, which he declares serve, like the locks and weirs on a river, to prevent the too rapid flow of the nutritive fluid, and to ensure its equable distribution.

This is a truly marvellous story. A great Galenic anatomist is the first to give a full and correct description of the valves and their function, but fails to see that any modification of the old view as to the motion of the blood is required. Two able dissectors carefully test their action by experiment, and come to a result the exact reverse of the truth. Urged by them the two foremost anatomists of the age make a special search for valves and fail to find them. Finally, passing over lesser peculiarities, an aged and honourable professor, who has lived through all this, calmly asserts that no anatomist, ancient or modern, had ever mentioned valves in the veins till he discovered them in 1574!

It is interesting to note that the three most distinguished pupils of the great orthodox anatomist were accused of heresy in religion as well as science. Vesalius was persecuted by the theologians, Etienne perished in the dungeons of the Inquisition, while Servetus, as all know, met a yet more terrible fate at the hands of Calvin. But the man who nearly anticipated Harvey deserves more than a mere mention. Medical history first meets with Michael Servetus, M.A., M.B., Paris, on a February afternoon, 1538, in the anatomy theatre of that university, where he has just finished dissecting a human subject, and is disputing with the dean of the medical faculty about some astrological lectures he had been giving. A few days later he sends certain Italian friends" to apologise to the dean. It

may have been in dissecting this subject, a rare thing at that time, that he noticed the solidity of the cardiac septum and large size of the pulmonary artery, which led him to the discovery of the so-called lesser circulation, and the "Italian friends" may have taken some hint of the new theory to Columbus at Padua. At any rate the first description of the pulmonary circulation was published by Servetus in his *Restitution of Christianity*, 1553, and the same theory was contained in the MS. copy of the work which he sent to Calvin at the end of 1545 or beginning of 1546. The reformer refused to return the manuscript, and lay in wait for seven years to slay its author, but a partial copy exists at Paris and contains the famous passage on the "vital spirits". Servetus begins by rejecting the doctrine of three spirits—natural, vital and animal—residing in the veins, arteries, and nerves respectively, and declares that the natural and vital spirits are not distinct, and that the fluids in the veins and arteries are of the same nature, thus removing one of the greatest hindrances in the way of Harvey's discovery. The vital spirit (*i.e.*, arterial blood) is formed from "a mixture made in the lungs of the inbreathed air with the blood which the right ventricle communicates to the left. This takes place, not through the cardiac septum, as generally believed, but by consummate art the subtle blood of the right ventricle is moved in a long passage through the lungs; by them it is prepared; it is made bright; it is transfused from the pulmonary artery to the pulmonary vein . . . it is purged from fume by expiration." He confirms this by the arguments noticed above, compares the connection between the artery and vein in the lungs with that between the portal and hepatic veins in the liver, and says that in the transition from artery to vein "there is a new kind of vessels in the lung formed out of vein and artery". It would be difficult to add much to this even at the present day, and Servetus might well claim to have discovered something unknown to Galen or to the greatest philosophers.

The early anatomists incurred risks of many kinds, as may be illustrated by the following story from Alexander Benedictus, professor at Padua at the beginning of the century. At the close of the anatomy course at Padua, a medical student left the university, taking with him some bones which he kept in a box with sweet herbs. Arriving at Venice in the evening, he left his luggage at an inn, and went out to enjoy himself. It got very late and he did not return, so "the impudent family of the publican" took possession of his baggage, and opened it in presence of the police. There they found the bones, and recognising an odour of sanctity, proceeded to adore them with bared heads and bended knees. Then they took them to the magistrate and accused the unfortunate student of rifling the shrine of some saint, in order to study the profane science of anatomy on his bones. In another age or place he might have been tortured till he confessed the name of the saint, and burnt for sacrilege afterwards; but the Venetian secular arm was then strongly in favour of anatomists, and he was rescued by "Franciscus Sanutus, consiliarius, vir summae virtutis," his accusers getting nothing but ridicule. Benedict tells the story so vividly that it seems not unlikely that he was himself the hero of it.

It is very interesting to read the original descriptions of various parts of our anatomy as given by their discoverers, but considerations of space confine us to the following account of the *pons* or bridge of the brain, by Constantine Varolius: "I observe another large process of the cerebellum which I have not found noticed by any, though the following description will show its great importance. There arises from either side of the cerebellum a process which passes downwards and forwards embracing the spinal cord somewhat in the same way as the broad transverse muscles of the larynx, forming the third pair of common muscles (inferior pharyngeals) embrace the top of the gullet. Any one may see the position of this process in the skull where is a well marked transverse depression just in front of the

foramen for the spinal cord. The modern opponents of Galen accuse him wrongfully when they say that he was mistaken in attributing the origin of some nerves to the cerebellum, for the auditory nerves, and I believe some others also, arise from this process. May I give a name to my discovery? When I saw the spinal cord passing under this transverse process like a canal under some bridge, I, for the sake of clearness, called it the bridge of the cerebellum, and have long been accustomed to use the term" (*Ep. ad Mercurialem*).

NOTES.

Carpi, *Commentaria Super Anatomiam Mundini*, Bologna, 1521. Vesalius, *De Corporis Humani Fabricâ*, Basel, 1543. A very full account of his biography, and of the great anatomists generally, may be found in Roth, *Andreas Vesalius Bruxellensis*, Berlin, 1892.

For the University of Padua during the sixteenth century see Papadopoli, *Historia Gymnasii Patavini*, Venice, 1727. Yriarte, *La Vie d'un Patricien de Venise au xvi. Siécle*, cap. ix.

Vicary's anatomy has been recently published by the Early English Text Society.

Sylvius named the cystic, gastric, intercostal, popliteal, and other arteries, and many muscles, including the obturators. It is not he, but his younger namesake, Sylvius of Leyden, who is recorded in the fissure and aqueduct of the brain. Here is his description of the valves: "Membranæ quoque epiphysis est in ore venæ azygi, vasorumque aliorum magnorum sæpe, ut jugularum, brachialium, cruralium, truncocavæ ex hepate prosilientis, usus ejusdem cum membranis ora vasorum cordis claudentibus" (*Isagoge*, i. 4).

For Servetus see Willis, *Servetus and Calvin*, the review of this work in the *Theological Review*, 1878, and especially the numerous papers by Pastor Tollin in Rohlfs' *Archiv* and other periodicals.

A. Benedictus, *Singulis Corporum Morbis Remedia*, etc., Basel, 1508, v. 23 (story of the student). In book xxii. cap. 48 there is distinct mention of lithotrity: "Aliqui intus sine plagâ lapidem conterunt ferreis instrumentis, quod equidem tutum non invenimus".

XLIX.—THE REFORM OF SURGERY.

THE progress of anatomy not only paved the way for Harvey, but brought with it a new surgery, founded no

longer on Galen and Albucasis, but on nature and experience. Many of the distinguished anatomists already mentioned were also able surgeons. Fallopius was both surgeon and physician, and here are two examples of his practice, the first recorded by his friend, Vidus Vidius, the second by himself. "Cirsoid aneurism. Arteries sometimes dilate like varicose veins, but more rarely because their walls are thicker. I saw, however, Alex. Boscolli of Florence, the arteries of the back of whose head from vertex to occiput were so swollen that they resembled huge varices, and pulsated vehemently. He came to Pisa to be cured by Gabriel Fallopius, who provided a great apparatus for excising the tumour; but when he began he was terrified by its size, and so let it alone, lest the man should bleed to death. He lived long after" (V.V., *Med.*, II., ii. 6-64). "When I was professor at Pisa, I attended the nuns in the convent of St. Paul to the East. There was a lady abbess there, and when I gave her pills she did not swallow them, but squeezed them flat with her fingers like little cakes, moistened one side with saliva, and applied them to the region of her stomach under a tight bandage. In four or five hours her bowels acted just as if she had taken the pills. I observed this in the reverend abbess during two years, and it seemed to me like a miracle" (*De Purg.* cap. ii.).

Mediæval surgeons, relying on a mistranslated aphorism of Hippocrates, held that wounds of certain organs, especially the brain were always fatal. Some cases appearing to disprove this had already been noticed by such writers as Theodoric, and Henry of Mondeville, and its complete refutation in the sixteenth century helped further to overthrow excessive trust in authority. Berengar of Carpi and Nicholas Massa (a famous Venetian surgeon), relate numerous instances of brain injury which recovered under their hands, calling God and man to witness that they are all true with what seems to us quite unnecessary vehemence. Brassavola (1500-1555), professor of medicine at Ferrara, commenting on the above mentioned aphorism, says: "I saw a soldier

of Corsica who recovered after losing nearly half his skull and the brain with it. But he remembered nothing; he could not talk nor understand anything; he only ate what was put in his mouth, *et totum se constercorabat et commingebat.* His comrades were taking him to Corsica. Whether he got there I know not" (*Com. ad Aph.*, xviii. 6).

Brassavola also wrote some interesting works on materia medica in the form of dialogues, which contain accounts of experiments on animals; and he is perhaps the first Christian practitioner to describe the operation of tracheotomy (or laryngotomy) from his own experience: "In angina when there is no other possibility of admitting air to the heart, we must incise the larynx below the abscess so that the patient may breathe through the opening. I myself made such an inçision with my own hands (Master Sanctus, the barber, having no courage thereto), in a man at the point of death and he was saved. The most illustrious Alphonso, third Duke of Ferrara, thought the thing so difficult that he condescended to visit the patient and to look at the opening. The operation was performed by the followers of the Arabs, and by the Arabs themselves, though some abhor it. And it was in use among the Greeks, for Paulus describes it (vi. 33) after Antyllus. Rhazes gives the following method (here follows a description taken from the *Continens*, vi. 22, which is copied verbally from Paulus, but as Rhazes adds: 'I find this a difficult operation, and it is better to incise the windpipe at the root of the epiglottis, though, according to Paulus, it should be avoided entirely,' he perhaps attempted the operation). Haly Abbas also used this mode of cure, and Avicenna says that when other things are useless, an incision should be made. Albucasis says no one practised it in his country; he does not, however, deny that it should be done, but explains that it is not done because surgeons are inexperienced and timid, and fear danger and disgrace. Mesue also considers it a difficult operation."

The four typical representatives of the surgery of the Renaissance are Ambrose Paré (1517-90), Peter Franco

(1505-70?), Gasper Tagliacozzi (1545-99), and Fabricius Hildanus 1560-1634).

The first of these, justly called the father of French surgery, rose from the lowest rank of his profession to be councillor of state and surgeon to four kings of France, and enriched his art both by the restoration of old and the invention of new modes of treatment. Something of his character, and one of his most important innovations, may be learned from the following shortened story of his first campaign. In 1536, his twentieth year, Paré went as surgeon of infantry with the expedition to Turin. In the first engagement a Captain le Rat was wounded. "I dressed him, God cured him," says Paré, a phrase which he repeats elsewhere, and which is now engraved upon his statue. On entering Susa he found three badly wounded men in a barn. "Can these men live?" asked an old soldier who followed him, and when Paré, said "No," he went up to them and cut all their throats sweetly and without wrath ("doucement et sans cholére"). The young surgeon was horrified, but soon had other things to think of, for in the next fight there were so many wounded that the boiling oil with which gunshot injuries were then treated, in the belief that they were poisoned, was exhausted, and Paré was obliged to resort to a simple dressing. He describes his anxiety during the night as to the fate of those thus treated, and his amazement at the favourable result, which determined him never to use the old treatment again. Among Paré's other services are the reintroduction of ligature in amputation, and of podalic version in obstetrics; the invention of improved forms of surgical instruments; the distinction between fractures of the neck and shaft of the thigh bone; and his notice of the fact that sound teeth accidentally knocked or pulled out may be successfully replaced in their sockets. Paré, like Paracelsus, wrote in his native tongue, but though a reformer, he was no revolutionist, and one of his aphorisms, "A tried remedy is better than one newly invented," may still be remembered with advantage.

The earliest known account of what is, perhaps, the most important of surgical operations (that for the relief of strangulated hernia), was published by Peter Franco in A.D. 1556. It was repeated by Paré in 1575, and by Rousset in 1581, neither of whom condescends to mention Franco, for he belonged to a class who were considered unworthy of the name of surgeons, the travelling lithotomists. Peter bitterly laments the low estate of his fraternity: "The physicians and surgeons, even the apothecaries, can defend themselves when they are unfortunate, but if we have a mishap we must often run for our lives". Some of his colleagues, he admits, deserve punishment as much as highwaymen, "for they fear neither God nor man, but plunder and torture their patients on pretence of benefiting them". His skill, however, soon raised him to a higher rank, and he became one of the salaried surgeons of the Republic of Bern. Franco is most widely known as the first performer of suprapubic lithotomy, and his works, though written in an illiterate style, contain the clearest descriptions of surgical procedures to be met with since classical times. His description of the symptoms of "stone" is especially good, but we have only space to give the classification. "In phlegmatic persons stones are usually white, smooth, and grow rapidly (phosphates). In the melancholic they are black, rough, hard, and grow slowly (oxalates). In the choleric they are reddish and of rapid growth, but sometimes soft (urates)".

The fame of Tagliacozzi, professor of surgery at Bologna, rests upon a single operation, that of rhinoplasm, or the manufacture of new noses. This feat, originally achieved by the Hindus, had been accomplished in another manner in the preceding century by certain Sicilian and Calabrian surgeons, who practised it as a family secret. Perhaps the earliest existing notice of the operation is the following letter which Calentino, a Neapolitan poet, wrote in 1442 to his friend Orphian, who had lost his nose: "If you want a new nose pay me a visit. Branca, a Sicilian surgeon, has found

a way to restore lost noses. He either takes flesh from the patient's arm, or engrafts on him a slave's nose. The thing is truly marvellous! As soon as I saw it I made haste to send you the news, for to whom could it be more important? Rely upon it, if you come hither, you can go away with as many noses as you like." To Tagliacozzi, however, belongs the credit of first fully describing the operation, of investigating the nature of the process, and of carrying it out with the most brilliant success. His fame as a restorer of noses spread throughout Europe, and Bologna was filled with his patients. But this success was not without alloy; he was bitterly attacked by the same class of theologians who afterwards opposed as impious the introduction of inoculation for small-pox, and the use of chloroform in obstetrics. They now accused Tagliacozzi of impiously presuming on the function of the Creator, and attributed the success of his operation to the assistance of the devil. And their hostility pursued him even to the grave. For many nights after his burial the nuns of a neighbouring convent heard a terrible voice, which cried, "Tagliacozzi is damned!" and the clergy of Bologna thereupon ordered the great surgeon's body to be cast out of the church and buried in unconsecrated earth. His colleagues, however, raised him a statue in the anatomy school, where he stands immortalised, a nose in his hand.

William Fabry, of Hilden, near Dusseldorf, whose name is recorded in medical history as Fabricius Hildanus, was worthy to have been the Paré, or even the John Hunter of Germany; but he was unfortunate in the time of his birth, for the good seed he sowed fell on fields already planted with the tares of Paracelsic mysticism, and destined to be ploughed by the cannon of the thirty years' war. Though without a university education, he had gained an intimate knowledge both of Greek and Latin, and it was the object of his life to raise surgery to the dignity of a science, and the surgeon to the rank of the physician. To this end he continually urges the student to keep abreast of the increasing

knowledge of the day, especially in anatomy, "the key, compass, and foundation of medicine," a science which should be studied not only by physicians and surgeons, but by the clergy and magistrates; in short, by all who have to guide or govern mankind. The surgeon should also study botany and chemistry, "for metallic remedies are of great value in medicine, as we daily experience, though when given by quacks and 'idiotæ,' they are like a sharp sword in the hands of a fool, or a lighted torch held by a child"; probably a reference to the Paracelsists, who were his special abomination. At Bern, where Fabricius was appointed city surgeon, he kept a private hospital, and gave clinical instruction to students and practitioners, while, like Hunter, he founded a museum containing not only anatomical and pathological preparations made by himself, but archæological specimens, the thigh bone of a mammoth and other curiosities. He was specially skilful in inventing new instruments, such as aural specula, splints, and forceps for removing foreign bodies, and he even made an artificial eye, which he presented to his pupils, to encourage them in their anatomical studies. But the reader should refer elsewhere for an account of the life and works of one who is perhaps the most attractive of the four great surgeons here briefly noticed, and we must conclude with a few extracts from his chief work, the *Six Hundred Surgical Cures and Observations*. On 25th April 1624, he writes to a Dr. Hagenbach, regretting that an attack of gout prevented him from going to the latter's wedding, and relates the following case as an example of the advantages of being married: "A countryman, Benedict Barquin, bought some iron, and was striking two pieces together to prove its quality, when a splinter flew into his eye and stuck in the cornea, causing him great pain. The local surgeons tried everything for many days to no purpose, and the pain and inflammation so increased that he came to me at Bern on 5th March. I used all means I could think of for some days, but the splinter was so small that it could not be removed by instruments. When behold! my wife

hit on the very thing. I kept the eye open with both hands, while she held a magnet as close as possible to it, and after several trials (for he could not stand the necessary light long) we saw the iron leap from the eye to the stone." This ingenious lady was a French Swiss from Geneva, named Marie Colinet, who, in her husband's absence, could not only treat diseases of her own sex, but even cases of fractured ribs and legs.

The following is an interesting example of nose making: "When the Duke of Savoy waged war against Geneva, A.D. 1590, there fell into the hands of the soldiers a modest and pious maiden, Susannah N——, quam cum stuprare frustra tentâssent, et hâc de re maxime irâ exciti essent, they cut off her nose. Two years later John Griffonius, a most ingenious surgeon, and very fortunate in his practice, came to Lausanne and undertook to make her a new nose, which he did to the greatest admiration of all men. I myself have often seen and examined it, for she is now living (1611) at Lausanne with a pious and honourable widow, Judith Mace. The nose has undergone no change, and the marks of operation are hardly visible; but in winter when it is very cold the tip turns a little blue. The inventor of this noble operation was the famous and learned C. Tagliacottius, professor of medicine at Bologna. Master Griffonius heard of it from an Italian who passed through Lausanne, and who had been cured by Dr. T., and he performed the operation before the latter published his work on the subject."

Fabricius is probably most widely known through his method of amputating with a red-hot knife. This plan had been used, or at least recommended, by Arabic and mediæval surgeons, but Fabricius improved it, as he considered, by increasing the thickness of the instrument, so that it could retain the heat throughout the operation. The method has, he declares, three great advantages: (1) It is less painful (!); (2) the muscles are more completely retracted, and therefore the bone may be divided higher up; (3) the loss of blood is very much less than when either a separate cautery or

ligature is employed; and he narrates how, by means of this *cauterium cultellare* he successfully amputated the leg above the knee, in a patient attacked by gangrene following dysentery, who was so prostrated that even a moderate loss of blood would have been fatal.

NOTES.

I am indebted for the reference to Brassavola's tracheotomy to Dr. Holmes' *History of the Progress of Laryngology*. Paré A., *Œuvres Complètes* by Malgaigne, Paris, 1840 (with valuable introduction and biography).

Franco: what is known of his life, and a reprint of the excessively rare, *Petit Traité*, etc., may be found in Rohlfs' *Archiv*, 1881-82 by Prof. Albert of Vienna. Tagliacozzi, *De Chirurgia Curtorum*, Venice, 1597. The story of his exhumation is given by Haeser, II. 197, on the authority of Corradi. Calentino's letter is printed by Gourmalen, also in Velhagen und Klassing, *Neue Monatshefte*, 1889, p. 604; Fabricius Hildanus, *Opera Omnia*, Frankfort, 1646; Müller, *Des Berner Stadtartzes Wilhelm Fabricius Hildanus Leben und Wirken*, Rohlfs' *Archiv*, 1883.

L.—MEDICAL PRACTICE IN THE SIXTEENTH CENTURY.

THE noisy controversies, new systems, and important anatomical discoveries which mark the medical history of the Reformation age, tempt the historian to neglect what is after all his main object, the description of the actual practice of the period. But he has little excuse for so doing, for the "Hippocratic" physicians justified their title by composing many volumes of clinical histories and observations, which give us a vivid picture of the best aspect of our art at that epoch. Besides these, the *consilia*, or letters of advice, still continued, though the writers are careful to assert that a physician is only justified in exceptional cases in prescribing for a patient he has never seen. As an in-

teresting example of such a *consilium*, we may take the twenty-first *Medical Epistle* of the already-mentioned Dr. John Lange. "You complain to me, as to a faithful Achates, that your eldest daughter, Anna, is now marriageable, and has many eligible suitors, all of whom you are obliged to dismiss on account of her ill-health, the cause of which no doctor can discover: for one calls it cardialgia, a second palpitation, a third dyspnœa, a fourth hysteria, nor are there wanting who say that her liver is out of order. Wherefore you entreat me by our ancient friendship to give an opinion on her case, with advice as to marriage, and you send me an excellent account of her symptoms. Her face, which last year showed rosy cheeks and lips, has become pale and bloodless, her heart palpitates at every movement, and the pulse is visible in the temporal arteries; she loses her breath when dancing or going upstairs, she dislikes her food, especially meat, and her legs swell towards evening, particularly about the ankles. I marvel that your physicians have not diagnosed the case from such typical symptoms. It is the affection, which the women of Brabant call the 'white fever,' or love sickness, for lovers are always pale, but there is very rarely any fever." He then discusses the pathology of the disease with copious Greek quotations from the Hippocratic treatise, *De Morbis Virginum*, points out that Hippocrates recommends marriage, and says that, with the addition of simple purgatives and emmenagogues, he never knew it to fail. "So be of good cheer, marry your daughter, and I shall be glad to come to the wedding."

Among the earliest writers of 'Observations' was Antony Benivieni, whose work *On the Hidden Causes of Diseases and Cures*, quoted in a preceding chapter, though it strictly belongs to the fifteenth century, may best be considered here. Of the two following extracts, the first is the earliest known description of senile gangrene, while the second is a case perhaps unique in medical history.

(1) "Those who suffer from the black ulcer, which the Greeks call gangrene, if it begins from the toe, and the

patients are old or in broken health, die rapidly. I knew Cambinus, Charles, and Thomas, citizens of Florence, and very many others affected by this disease, and they all died in a short time. The flesh gradually turns dark or livid, and sometimes dries up. The adjacent skin loses its sensibility, becomes pale or livid, and covered with black swellings. The disease creeps on till it affects the bone, and if you amputate, even through healthy flesh it will return again in the stump." (2) "A monk of the Order of St. Augustine at Florence came to me and complained that the bone of his head was wearing away daily. Surprised at this I felt his head, and found that the fore part was almost entirely boneless; and what was most amazing, there was no disease of the skin or flesh. Nothing did him any good, and in a few years he died, having lost nearly all his skull." Benivieni suggests that it may have been due to some fine acrid humour which, passing through the pores of the flesh, eroded the harder bone, just as a flash of lightning may melt the gold in a purse without injuring the latter.

One of the most famous physicians of the sixteenth century was Amatus Lusitanus, a Portuguese Jew, who, with some hundreds of his nation, had been forcibly baptised in childhood. He continued, however, to practise the religion of his ancestors in secret, and might perhaps have done so in security had he not published a commentary on Dioscorides, pointing out the mistakes in the famous edition of that author, by Matthioli of Siena; and the enraged botanist, unable to refute his adversary, loudly accused him of apostasy. We have seen how Saladin's judges treated a similar charge in the case of Maimonides; but the Christian theologians thought differently, and they hunted the unfortunate Amatus from place to place like a wild animal, till he found refuge at last among the Turks at Salonica. In one of his many flights he lost all his manuscripts, but fortunately recovered the most important, the first five "Centuries" of his *Medical Cures*, to which he afterwards added 200 more. The following are among the more in-

teresting of the 700 cases, and are given, for the sake of brevity, without comment.

"A girl whom I had cured of aphthæ, or ulcers of the tongue, fell down stairs, and her skull over the right temple was bent inwards, leaving a large depression, but with no apparent wound or fracture. I sent for a surgeon and ordered him to apply a cupping glass over the spot, and made a plaster of white of egg and astringent powders on lint, and in a few days she was well. I suppose all know that the bones of children are thinner and more full of blood than those of adults (see Hip. *On Head Injuries*), and therefore are easily bent but hardly broken; as appeared also in the son of a tanner, who lived with Malamtesta the colourman, who fell from a height and bent in his skull, but was cured in the same way." "A boy swallowed a brass coin, and discharged it a year afterwards, so worn away by the digestive power that all marvelled, for the innate heat is much greater in the young. I knew a man at Ferrara who ate leather, shells, and broken glass, so that they called him the ostrich; for nature has given that bird the power of digesting everything, as I saw at Antwerp." "Melancholia: The daughter of Vincentio the tanner, aged thirty, used to wash her head and expose it in the hot sun in order to turn the hair red. By so doing she fell into an arthritis, or general pain of the joints, which we treated by bleeding from both arms, applying oil of roses and chamomile to the joints, and purgative draughts. But two months later, in the autumn, she washed herself again, put her head in the sun, and went mad. I ordered her to be bled from the cephalic vein to six ounces, cupping glasses to be applied to her shoulders, and friction to her arms and legs. Then, after large doses of senna, Indian electuary, and other cathartics to purge melancholia, she recovered; for when I ordered her hair to be cut off, she said she would rather die than suffer it; so we sent her to sleep by putting lettuce and poppy seed in her food." Amatus then distinguishes melancholia and mania, which are due, he says, to excessive

heat of the black and yellow bile respectively. "Melancholia is first described by Homer, when he pictures Bellerophon wandering lonely on the Aleian Plain, 'eating his heart and avoiding the paths of men'; but this was not a bad case, for we easily made her laugh."

"I have prescribed many and various compounds for dyeing girls' hair auburn (fulvus), for we must comply with them even against our better judgment. I record the following not only because it is the simplest, safest, and most effective, but also because my very dear friend, Maria Baldwin, a noble Florentine lady, never used any other. Take Arabic alkanna (henna) such as merchants bring from Greece or Morocco, and make it into a paste with a little warm wine. Then anoint the whole hair up to the roots therewith. Keep the head covered for twenty-four hours; then wash in warm wine, and comb with a long-toothed ivory comb. Nothing more is required, so great is the power of this drug."

"A noble Frenchman, procurator of King Henry II. at Ragusa, got an affection, not of his reason, but of his imagination, for he fancied he had an abscess in his side, and offered great rewards to whoever would cure him. I found him in excellent health, with a rosy face and good pulse. He ate like a bull, drank like a Frenchman, and slept profoundly, but could in no wise be cured of his delusion, and proceeded to make his will and to give all he had to strangers, except one flagon, which he hugged, 'non secus ac elegantem puellam,' for it was full of generous wine." Amatus administered large doses of hellebore and senna to no purpose, till, remembering how Alexander of Tralles cured a patient who thought he had a serpent inside him, he determined to do likewise, and performed an imaginary operation with complete success on 8th March, 1557, the pus being represented by a mixture of hen's blood and milk. "The Turks treat gout by bringing in a goat to the patient and milking it over the painful limb, a remedy which, if effectual, should be borne in mind by all who seek wealth and honour." But diet is the great thing. "At Rome I treated Camillus, of

the princely family of Colonna, for gout. On taking charge of the case I gave him full directions as to diet, which he swore to follow. But, *Deus bone!* hardly had he taken his sixth dose of purgative medicine than he ate a supper of fried eggs and all sorts of shell fish, not without punishment, for he was grievously tormented all night. As soon as I dismounted from my mule next morning his servants ran up and told me all about it. (Always find out as much as you can from a patient's servants.) So, when he complained, I accused him of having broken his promise, etc." In short doctor and patient had a regular quarrel. "And I would not have gone back to him again; no, not if he had offered me one of his estates."

"Paul of Aquila, aged 20, a monk of the Order of Cruciferi at Pesaro, fell in love with the gardener's daughter, Catherine Arimini, and wished her to flee with him to Germany, where he would throw off his vows and marry her. And he often besought her on his knees to pity him, else he would die or kill himself. When he could bear it no longer he secretly bought some vitriol of an apothecary and drank it. Hence he got erosion of the stomach, with vomiting, diarrhœa, and blackness and swelling of the tongue. Medical aid was useless, and the good monk gave his life for his love on the same day, February 5th, 1556."

"A young Jew at Salonica fell so desperately in love that he was quite demented. So I undertook his cure, and prescribed the regimen for melancholia (see page 150), together with a syrup of hellebore of my own composition, and a purgative containing lapis lazuli. But he went to the girl's house and climbed up to her chamber with a rope ladder. There he found her relations and punished them severely with his fists (*eos pugnis pessime afficit*). The watch was called in, and he was taken to prison. After staying there some days he perfectly recovered."

"A boy of twelve was struck on the left temple where was a small mark. Severe symptoms set in on the third day, and his head was shaved; but because of the symptoms

and because he complained of pain on the opposite side, we trephined there, and found pus already formed, to the admiration of all beholders. He recovered in thirty-five days."

At Ragusa, Amatus was called in as an expert witness in the case of a woman accused of bewitching a young noble and making him deaf. He drew up a long report, expressing his opinion that it is impossible to cause deafness by incantations, that no drugs had been used, for they would have acted more rapidly and have caused other serious symptoms, and that the nobleman was suffering from a disease (*morbus gallicus*) which sometimes caused deafness. So the prisoner was acquitted.

Amatus confines himself chiefly to striking and extraordinary cases, but his contemporary, Peter Forest of Alkmar, who became first professor of medicine at the new University of Leyden, has left us an immense collection of "Observations," medical and surgical, dealing with all the more common diseases. Unfortunately, they are most of them too long for quotation, but I venture to translate an interesting personal episode from the middle of a long description of "lichen and impetigo," and two brief accounts of the sweating sickness and influenza. "I myself while at Rome, October, 1544, had a sort of impetigo or acne on the forehead. I had been collecting herbs and simples with the learned Valerius Cordus, and when he died (*proh dolor*) in my arms from a malignant semi-tertian, I fell, through long watching, into a similar fever with sore throat, which was cured by crisis with much sweating on the seventh day. But then appeared red hard swellings like morbilli or acne spots the size of half a bean on my forehead with continual headache. On the second day my teacher, Gisbert Horst, the excellent physician to the hospital of Maria Consolatrix, visited me, and as soon as he saw the spots he smiled and said: 'If I did not know you, and recognise that as a 'critical' eruption, I should call it *lues gallica*'. 'But how shall we cure it?' said I. Finally we agreed to leave it alone, lest it should strike inwards, according to Hip. *Aph.*

1-20. I stayed at home for some days though quite well, for I was ashamed to go out with those spots on the forehead, serpiginous and visible to all. Finding they got worse I rubbed them twice a day with my own saliva, and so they got well without any medicine. Avicenna recommends saliva with camphor in impetigo. I used no camphor, but by the blessing of God, recovered and the spots never returned" (*Obs. Chir.*, ii. 13).

"The English sweat: This deadly malady is of new appearance; it recurs at intervals, and for nearly forty years has been peculiar to England. Medical aid avails nothing; and it has slain such a multitude that one would hardly suppose the island had so many inhabitants. No disease is more horrible or contagious, but it has this advantage that it does not plague men with prolonged torments, but kills them or passes over within twelve hours. The chief symptom is a rapid sweat, fiery, and of most unpleasant odour, together with pains in the fingers and arms, so that the latter become paralysed (*ut alas, etiam si velis, non possis attollere*). They who were impatient of the heat and let in air freely, usually died at once; others, seeing their evil fate, went to the opposite extreme, and fell into a like perdition. For they shut up all cracks, lighted big fires, covered themselves with blankets that they might sweat the more, and were suffocated by the heat. But on the whole, cold brought the most rapid death. At length they found the mean, and then more recovered than died. After so many dissensions, wars, slaughters, and famines, the disease passed in 1529 from England to Norway and Denmark, swept furiously through Poland, crossed Germany to the Rhine, and after the dog-days descended that river from Cologne to Brabant and Flanders, invaded Holland, and entered Amsterdam on the afternoon of 27th September in a thick fog. There it raged most cruelly for three or four days, and passed through Zeeland back to England where it now holds quiet possession. As to treatment, purgation and venesection were employed at first till sweat broke out, when barley water and

mild cardiac diaphoretics were administered. The English physicians use no drugs, but wait for the sweating, for when it is free nearly all escape, but if it is suppressed most perish. Wherefore they order absolute rest in bed for a whole day, and those who obey are rewarded by recovery, but they who toss about, and demand fresh air, stop the sweat, and die by their own fault" (*Obs. Med.*, vi. 7).

"Epidemic catarrh at Delft, 1580: At the end of June and throughout July epidemic catarrhs spread *publice ac catervatim* throughout the neighbourhood. They were of sudden onset, very contagious, accompanied with fever, and inflammation of the throat and lungs, with hoarseness and coughing, so that whole families were suddenly struck down thereby; but the disease was not very dangerous, and many easily escaped by immediate bleeding and gentle purgatives, though in some it passed on to peri-pneumonia, and others had severe pleurisy. This febrile epidemic raged not only here but throughout France and Germany, and came to us *afflatu quodam* from those regions. After July it decreased, but revived in the autumn when many recovered without bleeding; but in winter the catarrhs were worse, with bloody sputa and pleuritic pains, and venesection then seemed to be useful. It is very important, therefore, to recognise which patients require bleeding and which do not. And the same is the case with drugs. At the Hague many treated themselves, as I hear, by taking theriac with a little gold leaf and saffron, without calling in medical aid. But it is better to use rational methods, and not treat every case with one drug. I avoided wine, for when taken largely it seemed to cause delirium and mania. If you say wine should be given because of the weakness, I shall reply that when strength can be supported by other and safer means I prefer not to use it. I am far from denying that wine is of value in catarrhal cases, only when there is violent cough sugar candy (*saccharum candi*) as they call it, should be added.

NOTES.

Benivieni, *De Abditis et Mirandis Morborum et Sanationum Causis*, Florence, 1506. This work contains an interesting example of ligature in amputation a generation before Paré. A young monk had mutilated himself from religious principles. "I was unable to stop the bleeding (says Benivieni) till I had seized each vessel with the forceps and tied it."

Amatus Lusitanus, *Curationum Medicinalium Centuriæ vii*, Burdigalæ, 1620. A good biography is that by Max Solomon in Hirsch, *Biographisches Lexikon Hervorragenden Aerzte*, Vienna, 1884, etc.

Forestus P., *Observationum chirurgicarum Libri*, v., Frankfort, 1634; *Observationum et Curationum Medicinalium Libri*, xxxii., Leyden, 1593-1606. Forest's description of the sweating sickness should be compared with the famous account given by our own Caius.

LI.—HARVEY, AND THE NEW PHYSIOLOGY.

"I DREAMT I was in a vast catacomb, the air was thick and all was pitchy dark, the voice echoed, and swarms of bats were the only dwellers therein. And I thought, 'This is nothing else than the Tomb of Medical Truth,' and managed to make an opening which let in some light. Then me seemed that Galen tried to enter thereat with his small lamp; but he was fearful, and tottered, and fell full-length on the threshold, and upset his oil: yet when he rejoined his companions, he told them wondrous tales of the cave, and they repeated all his stories, nor cared to investigate them. Next I saw Avicenna, and a crowd with him. He had learnt somewhat from Galen, yet got he not much further, for a giddiness came upon him, and he stumbled against a stone and fell prostrate: but when he got out he boasted none the less, in his strange tongue, that he had seen much more than his predecessors. Many followed, some in Galen's fashion, others in Avicenna's, but all fell; some ventured in with no light at all. These saw nothing. At length I beh[illegible]r [illegible]sus enter.

He had more foresight, and took a huge torch, and fastened a thread at the entrance that he might find his way back. So he penetrated farther than any mortal before him, and went about the cave and saw many things. But the smoke from his torch filled the passages, and as he would have looked more closely at the Tomb of Truth, his strength failed and the light fell from his grasp. And lastly, I, poor mortal, ventured in with the dim light of a lantern at my girdle, and a thread hooked on behind that my hands might be free. And I saw much which those before me saw not; but being alone, I had not strength to accomplish what I would have done; and though I strove valiantly, the crowds of bats pressed upon me, so that I had to return with little profit."

So writes Van Helmont, though I have ventured to condense several pages into a paragraph. But while he was having this and other dreams, to be considered shortly, an English physician, one year his junior, was engaged in illuminating the Cave of Medical Truth, as with an electric light, whose beams pierced even the fogs from the smoky torch of Paracelsus. This was William Harvey (1578-1657), but we need not here describe what he discovered, or how he discovered it; may not the story be read by all in the shortest and most important of our medical classics, the immortal *Anatomical Exercise on the Motion of the Heart and Blood in Animals* (1628)? Our space will be better occupied by considering what was the precise effect and importance of the discovery, and why, in the history of our art, the name of Harvey is placed second only to that of Hippocrates.

Even the most vehement opponents of physiological research will probably admit that it is important for a physician to know that the blood circulates. But in the time of Harvey, and for more than a century afterwards, they might have argued that the discovery, and the numerous vivisections which led to it, had not only not produced any new and successful mode of treatment, but by giving rise to one-sided theories, such as those of the mechanical school,

had rather retarded than furthered the progress of the healing art. The physiologists would doubtless have replied with Harvey that the new doctrine had let in upon them a flood of light and truth, had explained many problems and resolved many doubts, and had suggested the causes of many diseases and the best mode of treating them. They might have added that it had given its death-blow to the Galenic tyranny, had substituted observation and experiment for custom and authority, and had put a final end to such controversies as that between the Derivationists and Revulsionists, in which so much time and mental energy had been wasted. Could they have foreseen the future they might have finally pointed to the work of Harvey as the model for all later physiologists, and as the chief corner-stone of that sure foundation on which there should one day be built a rational and progressive science of medicine. "Before Harvey," says a distinguished French physician, "the sick man was looked upon from without—the symptoms; since Harvey, he is looked upon from within—the functions."

But we must admit that the new theory was at first a light-bringing rather than a fruit-bearing discovery; and the same has been the case with the countless lesser discoveries which have followed and resulted from that of the circulation. They may be compared to lamps set up in various parts of the above-mentioned cave, sometimes shedding light on things immediately useful to the practitioner, but more often revealing hidden passages, the exploration of which has resulted in increasing our knowledge of disease and its treatment in ways little dreamt of by the original investigators.

One such lamp had already been set up in 1622 by Gasper Aselli, Professor at Pavia, who, while demonstrating by vivisection the action of the recurrent nerves and diaphragm, noticed numerous white lines on the mesentery. Suddenly there flashed across his mind the tradition of peculiar mesenteric vessels seen by the ancient anatomists, and he cried out with Archimedes, "Euréka, I have found

it!" He had found the lacteals. But while Harvey left his discovery complete so far as was possible without the aid of the miscroscope, that of Aselli had to be finished and corrected by two medical students, Pecquet the Frenchman, and Rudbeck the Swede. According to Galen the products of digestion are carried by the portal vein to the liver and there converted into blood; and Aselli concluded, as a matter of course, that the lacteals also went to the liver. In 1647, however, Pecquet, a student at Montpellier, tired of "the dumb and cold science of anatomy," took to vivisection, and immediately discovered the receptacle of the chyle and the thoracic duct, which he traced to its termination in the veins. Three years later Rudbeck, a godson of the great Gustavus Adolphus, while studying medicine at Leyden completed the investigation by finding the lymphatics, and he demonstrated these and the thoracic duct, which he had discovered independently of Pecquet, before Queen Christina of Sweden and a distinguished company in 1652. Both Pecquet and Rudbeck were great admirers of Harvey, whom they imitated even in the titles of the treatises, *New Anatomical Experiments* and *A New Anatomical Exercise*, in which they announced their discoveries.

Finally, in 1661, four years after Harvey's death, ocular proof of the circulation was given by Malpighi of Bologna. He tells us that, while examining the lung and mesentery of a frog with a lens, he noticed the contrary motion of the blood in the veins and arteries, but could not, at first, trace the connection between the two; till, on examining a piece of dried lung by transmitted light with a more powerful lens he distinctly saw a network of fine vessels full of blood connecting the arteries with the veins. Aided by this, he beheld the wonderful spectacle of the circulation, first in the lung of a tortoise, and afterwards in the lung and bladder of a frog; but it seems never to have occurred to him to examine the web of a frog's foot.

Thus, in a single generation, the whole aspect of physiology had been entirely altered, and the work was carried on

with vigour for the rest of the century. We need only mention the Englishmen—Cowper, Glisson, Havers, Highmore, Lower, Willis, and Wharton; the Danes—Steno, Bartholinus, and Worm; the Germans—Kerkring, Meibom, Schneider, and Wirsung; the French—Vieussens and Duverney; the Swiss—Peyer and Brunner; the Dutch—De Graaf and Nuck; all contemporary physicians whose names are immortalised in various parts of the human body. The work of some of them will be referred to hereafter, but we must conclude for the present by noticing two discoveries, the great importance of which was long overlooked.

Dr. Richard Lower had proved, by experiments on animals, that the change from venous to arterial blood takes place only in the lungs, and only in the presence of atmospheric air; as, indeed, Servetus had asserted a century earlier. But his friend John Mayow (1645-79), one of the greatest physiologists of the seventeenth century, carried the investigation a step farther, and showed that the agent of this change is a particular constituent of the air, which also supports combustion and is contained in nitre, and which he therefore called "nitro-aerial spirit". In short, he had discovered oxygen, though it had to be rediscovered a century later.

In September, 1683, Antony van Leeuwenhoek wrote from Delft to the secretary of the Royal Society announcing his discovery in the white matter between his teeth of microscopic animals, "moving in the most delightful manner"; and he added a sketch in which we may clearly recognise the four chief forms of microbe, the longer and shorter rods of bacilli and bacteria, the minute spheres of the micrococci, and the corkscrew-like spirillum. He expresses his wonder that, in spite of his care in cleaning his teeth, his mouth should contain more "animals" than there are human beings in the united Netherlands, and says he had tried in vain to get rid of them by washing his teeth with vinegar. Sometime afterwards he began to take hot coffee, and the microbes disappeared, but they soon returned, in spite of

continued coffee drinking. Leeuwenhoek says he hopes the fellows of the Royal Society will be interested by this novelty, but he certainly had no idea that the discovery was destined one day to exert a greater influence both on medicine and surgery than even that of the circulation.

NOTES.

Van Helmont's dream is from his *Tumulus Pestis.*

Harvey's *Exercitatio Anatomica* has frequently been republished since 1628, and is translated into most civilised languages. Perhaps the best English version is that by Willis, Sydenham Society, 1847; see also the biography by the same writer, London, 1878.

Works on the circulation of the blood are innumerable; among the most important are Hecker, *Die Lehre vom Kreislauf vor Harvey*, Berlin, 1811; Flourens, *Histoire de la Découverte de la Circulation du Sang*, Paris, 1844; the above mentioned works of Dr. Willis; three papers in the *Lancet*, 1876-77, by S. Gamgee; Kirchner, *Die Entdeckung des Blutkreislauf*, Berlin, 1878. The boldest attempt to deprive Harvey of the honour of the discovery was that made by Ceradini (*La Scoperta della Circulazione del Sangue*, Milan, 1871) on behalf of Cesalpino. It is fully refuted in the later treatises noticed above, especially that by Kirchner.

Malpighi describes his experiments in his letters to Borelli, *De Pulmonibus*, Bologna, 1661. Aselli, *De Lactibus seu Lacteis Venis*, etc., Milan, 1627.

There was a long controversy between Rudbeck and Bartholinus about the lymphatics. The truth seems to be Rudbeck first discovered them, while Bartholinus first published an account of them. An English physician, Joyliffe, observed them about the same time but published nothing on the subject. Aselli had already (in 1627) described and figured the lymphatics of the liver, though he unfortunately mistook them for the endings of the lacteals.

A biography of Mayow is given by Sir B. Richardson in his *Asclepiad*, 1887, see also Gamgee's *Physiological Chemistry*, vol. i. Leeuwenhoek, *Arcana Naturæ*, Delft, 1697.

LII.—VAN HELMONT.

JOHN BAPTIST VAN HELMONT (1577-1644) is almost as striking a figure in medical history as Paracelsus, whom he re-

sembles in many respects, though he surpassed him both in genius and learning. His character is so closely connected with his doctrines, that it will be necessary to give a few biographical details. The youngest son of a noble Flemish family, Van Helmont lost his father in childhood, and received a pious and strictly Catholic education from his mother. He then went through the university course at Louvain, but refused the degree of M.A., declaring that so far from being "Master" of the seven liberal "Arts," he was not even a disciple in one, and that his knowledge, like Adam's, had served only to show his nakedness. After dabbling in magic, he betook himself to the study of ethics, as the only worthy form of knowledge, and read especially the works of Seneca, Epictetus, Thomas à Kempis, and John Tauler, a mixture of Stoic philosophy and Christian mysticism which did not fail to produce a moral nightmare. He dreamt he saw himself like a huge empty bladder reaching from earth to heaven, but above him, instead of heaven, was a coffin, and below him the blackness of the abyss. So he saw that Stoicism is but a form of pride, and man, without the inspiration of God, a thing of nought and a vain shadow. A rich living was offered him if he took orders, but he was frightened by the saying of St. Bernard, that he would live from the sins of the people. Then he thought of law, but soon found that its ordinances were often far removed from truth and justice, and how should he guide and restrain others who found it hard enough to govern and direct himself? So he turned to Dioscorides and Matthioli to study the goodness of God in the virtues of herbs, and this led him to medicine. Here, he thought, was a science in which a student bent upon relieving the miseries of his fellows could not fail to receive Divine assistance, and the great teachers of which must be men inspired of God, even as were Bezaleel and Aholiab, the builders of the Tabernacle. He carefully studied all the approved medical authors, taking notes of everything that seemed valuable; then he read the notes and was overwhelmed with disappointment and despair.

"I said in my heart: 'O merciful God, how long wilt Thou be angry with man, that Thou hast not revealed one truth to Thy students in healing? Is this Moloch sacrifice pleasing to Thee, and wilt Thou that the lives of the poor, of widows, and of children, be continually offered up to Thee in miserable torments of incurable diseases or through the carelessness and ignorance of physicians?' Then I fell on my face and cried: 'Lord have mercy! pardon, pardon me, O Lord, if love of my neighbour has led me beyond bound, for Thou art the root of all goodness, Thou knowest my sighing, and that I confess I am empty, ignorant, poor, and naked, and have nothing, am nothing, and can do nothing'." But he was encouraged by a dream to persevere in his work, and having taken the degree of M.D. at Louvain, set himself no less a task than "to overthrow the entire philosophy of the ancients and establish a new science of Nature." The existing medicine, he says, is based on that of the pagan Greeks, and considers only the outside of things, but Christian science like Christian morality must begin from within.

To Van Helmont all nature is alive; there is no such thing as dead matter, but in animals this material life, as we may term it, assumes an almost personal form, which he calls "Archeus," a word already used, though more vaguely, by Paracelsus and Basil Valentine. Every bodily structure has its local "Archeus insitus," and the whole organism is governed and directed by an "Archeus influus" who builds up the body and supports its activity, working always according to a fixed plan, or "seminal idea" impressed by the Creator. This Archeus resides in the stomach, and is closely connected with the sensitive and rational soul, the two together forming a sort of husk or shell for the higher intuitive or intellectual spirit. For Van Helmont distinguishes between intellect and reason, and declares that the latter is an inferior quality, acquired by, and necessary to, man since the Fall, but leading nearly as often to error as to truth. The heathen Aristotle in his blindness bowed down to reason, and set it up as an idol in the form of Logic, a vain science,

which deals only with externals and definitions. One definition, indeed, is important in medicine—that of disease, for it is not a mere matter of words, but affects the lives of men; and here the pagans and their Christian disciples have gone hopelessly astray in spite of their logic. For they call disease "a lesion of structure or functions," and declare that its cause is a change in the fluids or humours, the disease itself being in the solids, while the spirit or "pneuma" directs the symptoms. The reverse is the truth, for disease affects the life, and must, therefore, have its seat in the life, or Archeus, through whose action it produces changes in the solids and fluids. How can an organic lesion be a disease, for it persists in dead bodies, and the dead can have no disease? "Whatever produces healthy actions in the sound, the same causes vitiated actions in diseases." (Quidquid in sanis edit actiones sanas, idipsum in morbis edit actiones vitiatas.) Disease is a morbid idea conceived by the Archeus, either through his own infirmity, or from the action of some harmful agent, which causes him to deviate from his normal course and act in another way, but always after some fixed and specific plan. There are thus two great divisions—(1) innate diseases, under which head he classes inherited and latent affections, such as epilepsy, and (2) those due to external agencies, among which the results of witchcraft, *injecta a sagis*, play a large part.

He applies these doctrines to special instances with much ingenuity. Fevers, say the Galenists, are either simple, and due to præternatural heat originating in the heart, or putrid, caused by a corruption of the humours, especially the blood; and they treat them by bleeding, purgation, and cooling medicines. This, according to Helmont, is false, for heat is merely a symptom, and the blood never putrefies during life. Fever is the effort of the chief Archeus to get rid of some irritant, just as local inflammation is the reaction of the local Archeus to some injury. The heat is caused by the anger of the Archeus, who tries to shake off his enemy by calling up cold and hot fits, a *blas frigoris* and *blas caloris* and

finally a *blas alterativum*, or fœtid sweat. The intermittencies are due to his taking breath for another effort, and the therapeutic indication is to assist him by giving support, especially by wine, and to imitate his action by the use of diaphoretics. Bleeding is Helmont's special abomination, for nothing is more calculated to weaken and irritate the Archeus. "I see a blood-stained Moloch presiding at the councils of physicians. Repent, repent, therefore, my brethren, for there cometh a terrible day upon the world at the sound of the trumpet, when every man shall give an account of his deeds." Catarrhs, according to the Humoralists, are caused by phlegm rising to the brain, where it is condensed as by a cold dish cover, and flows down into the nose, eyes, lungs, joints, and muscles, giving rise to coryza, bronchitis, and different kinds of rheumatism, diseases to be treated mainly by purgatives, demulcents, and "hot" medicines. Helmont calls these theories absurdities, *catarrhi deliramenta*. Phlegm is secreted by the local Archei, or "guardians," as he here terms them, to protect the tissue from irritants; but if the irritation continues the guardian gets reckless, he becomes a *custos errans*, and secretes mucus of bad quality and excessive quantity, so as to block up important passages, which the presiding Archeus has to reopen by setting up sneezing and coughing. The proper treatment is obvious. In slight cases nothing more is required than to remove the cause of irritation; in severe coryza he recommends a sternutatory or snuff of powdered hellebore and sugar, equal parts, and a reduction of diet, especially in fluids, so as to cut off the errant guardian's supplies. Sulphur is sometimes useful in bronchitis, and when the Archeus overdoes the coughing he may be restrained by the use of narcotics.

Divested of its fantastic language, we must admit that there is much valuable truth in the above, and Van Helmont rendered additional services to medicine by his chemical researches, which resulted in the discovery of carbon dioxide, and in the proof that an acid takes part in gastric digestion.

He was directed to chemistry by his early admiration for Paracelsus, but soon became dissatisfied with his master, and his refutation of the latter's most characteristic theories is not the least important part of his work. The doctrine of signatures, says Helmont, is false, and rests on the pagan delusion of the microcosm. "I believe that God reveals remedies to whom He will by special grace, not *per signa Naturæ*, for man is not the image of Nature, but of God." He similarly attacks the Paracelsic doctrine of "tartar" and of the mystic elements, salt, sulphur and mercury. But, on the other hand, he strongly upheld the virtue of the sympathetic ointment, and his works abound in absurdities surpassing even those of Paracelsus. We have only space for one example. Dropsy is, he says, not due to an organic lesion of the liver, but to the anger of the renal Archeus, who has lost his temper, and refuses to work. One way of reducing him to order is to terrify him, and this may be done by tying a snake round the patient's waist and applying live toads to the region of the kidneys.

The rules of *contraria contrariis* and *similia similibus* are equally false, both being merely treatment of symptoms. The true principles of therapeutics are to remove the harmful products of disease, and above all to pacify the Archeus, and bring him back to his normal course of action by the use of specific remedies. For Van Helmont, like Paracelsus, holds that special medicines exist for the cure of every disease, and that each country produces its own, so that it is needless to bring new drugs from the ends of the earth. He would, therefore, probably have rejected quinine, which was introduced shortly before his death, for he declares that "it is inconceivable that the merciful Father of mankind should have been less merciful to his European children, before the discovery of the Indies than afterwards".

NOTES.

Van Helmont's biography is derived chiefly from the preface to his chief work, *Ortus Medicinæ*, *Opera Omnia*, Frankfort, 1797. There is an

English translation of most of the treatises by J. C., London, 1664. Very complete criticisms of his work may be found in Spiess, *J. van Helmont's System der Medicin etc.*, Frankfort, 1840, and the prize essays of Drs. Rommelære and Mandon (in the *Mémoires de Concours de l'Académie Royale de Médecine Belgique*, Brussels, 1868) to the former of which I am much indebted.

LIII.—THE CHEMICAL SCHOOL OF MEDICINE.

THE origin of the so-called iatro-chemical school is often traced to Van Helmont, but its doctrines may be rather contrasted than compared with those of the Flemish physician, which are far more closely allied to the later vitalistic theories. The seventeenth century, like our own, was an age of physical science, a character due partly to a reaction from the mysticism of the preceding period, but especially to the influence of the discoveries of Harvey and Galileo, and the teaching of Bacon and Descartes. Bacon, by formulating the principles of inductive science, had pointed out the true path of progress between the barren desert of Aristotelean dialectics on the one side, and the mist-enveloped swamp of Neoplatonic theosophy on the other; but his influence on medicine is probably less important than that of Descartes. It seemed to the French philosopher that the universe contains two distinct things—matter, with the characteristic property of extension; and mind, with the characteristic property of thought, between which he held that there can be no conceivable connection; and he declared that the only proof of the existence of mind is conscious thought—*Cogito, ergo sum.* But all the processes of life may go on without conscious thought, therefore vital activity is of a purely material character; and Descartes boldly asserted that animals are merely self-acting machines or automata, while man is a similar machine with a mind behind it and sometimes acting upon it. This Cartesian dualism, as it may be called, dominates the medical theories of the seventeenth and part of the

eighteenth centuries, as well as those of our own day, but it is the very reverse of the doctrine of Paracelsus and Van Helmont, who held that matter and mind are intimately connected, and that all the processes of nature are lower or higher, less or more self-conscious manifestations of one universal life. The physicians of the seventeenth century made two attempts to solve the problems of life and disease on purely materialistic principles, one by the aid of chemistry, the other by the aid of mechanics, and thus arose two schools or systems of medicine known respectively as the iatro-chemical and the iatro-mechanical.

The foremost and most typical representative of the former school is Francis de la Boe (Sylvius) (1614-72), whose chemistry, however, is based not upon that of the Paracelsists with its arcana and quintessences, but upon the more sober observations and experiments of their great opponents, Libavius and Sennert. And he contrasts with his predecessors in his purpose as well as in his method. Paracelsus and Van Helmont had attempted to overthrow Galenism, and to replace it by new systems evolved largely from their own inner consciousness; Sylvius, on the contrary, strove to re-establish the humoral pathology on a firm basis of chemical facts, and he may not inappropriately be called "the last of the Galenists".

Sylvius commences with principles worthy of a disciple of Harvey, Bacon and Descartes. Nothing, he says, is to be admitted as true in medicine or natural science unless experience has confirmed and shown it to be true. As regards medicine, this experience may be classed under three heads: (1) anatomical, (2) chemical, (3) clinical; but he warns his pupils against falling into the error of the old Empirics, that of drawing conclusions too hastily, and proposes to divide his results into conjectures, suspicions, opinions, and conclusions, according to their relative scientific value. Medicine, he declares, still rests mainly upon evidence of the first kind, and, though a progressive art, does not yet deserve the name of science. Its firmest pillars are anatomy,

chemistry, and Harvey's doctrine of the circulation, which he vigorously defends against all remaining adversaries.

From such a preface great results might have been expected, but unfortunately even men of scientific mind are apt to give the rank of opinions, if not of conclusions, to theories of their own, which, if put forward by others, they would justly class among conjectures; and contempt for authority, though frequently leading to new truth, may also give rise to error. So now it was with the Leyden professor. Among the matters in which most follow authority rather than reason is, says Sylvius, the doctrine that the bile is secreted by the liver, and passes thence into the gall-bladder. Careful anatomical observation has convinced him that this is absurd, and that the bile is secreted directly from the cystic artery into the gall-bladder, whence it passes partly into the intestine, and partly through the liver and vena cava into the heart. Here it meets with the acid lymph, brought by the thoracic duct and superior vena cava, and the combination of the acid and alkaline fluids produces a mild fermentation, the source at once of the bodily heat and the diastole of the heart. If either the acidity of the lymph, or the alkalinity of the bile be increased, the fermentation becomes more active, and we get increased heat and exaggerated action of the heart, or, in other words, "fever". Excessive increase or decrease of this cardiac fermentation causes death, and he explains the rapid collapse in "cholera" by the fact that all the bile is expelled by the intestine, and none left to go to the heart. The active parts of the body are the fluids or humours, the solids serving chiefly to contain them (*partes continentes*), and most diseases are due to an "acridity" of some humour, which may have become either too acid or too alkaline. Sylvius modestly admits that the above theories are only "opinions," but he nevertheless makes them the basis of his whole medical system.

In his therapeutic doctrines we find equally admirable principles, followed by a far less satisfactory application. The indications for treatment are, according to Sylvius,

four in number—vital, curative, preservative, and symptomatic, or, in other words, to sustain the vitality, to cure the disease, to remove the predisposing cause, and to counteract any urgent symptoms. But in practice he reduces them to two—to suppress, by the use of narcotics, any violent symptoms which tend to exhaust the patient, and to counteract the excessive acidity or alkalinity by the use of contraries. The most common cause of disease, he considers, is "acidity"; therefore, when in doubt, give an alkali.

A system which thus combined the prestige of the humoral pathology with the simplicity of the ancient methodism, and the interest of the new chemistry, was sure to be widely accepted, and traces not only of the theories, but even of the prescriptions of Sylvius survived almost to our own times. The most famous of the latter was the *Elixir Proprietatis*, which was largely used up to the middle of this century, and which closely resembled the "aromatic sulphuric acid," or elixir of vitriol of our present pharmacopœia.

But Sylvius has other and better claims to remembrance than that of being founder of a superficial and one-sided medical system. His name is justly immortalised in the human brain, the structure of which he did much to elucidate, and, above all, it is from him that we date the permanent establishment of clinical teaching in public hospitals. Bedside instruction had been given, as we have seen, in classical times, in the ancient Nestorian and Arabic schools, and by mediæval practitioners such as Lanfranc; and the system had been revived for a short period during the renaissance at Padua, when students from every part of Europe flocked to that famous university. But it is to the little infirmary of Leyden, with its twelve beds, that we must look for the true origin of the modern practice of "walking the hospitals". Writing in 1664, Sylvius observes: "I have led my pupils by the hand to medical practice, using a method unknown at Leyden, or perhaps elsewhere, *i.e.*, taking them daily to visit the sick at the public hospital.

There I have put the symptoms of disease before their eyes; have let them hear the complaints of the patients, and have asked them their opinions as to the causes and rational treatment of each case, and the reasons for those opinions. Then I have given my own judgment on every point. Together with me they have seen the happy results of treatment when God has granted to our cares a restoration of health; or they have assisted in examining the body when the patient has paid the inevitable tribute to death."

The English representative of the chemical school of medicine was Thomas Willis (1622-75), whose name, like that of Sylvius, is best known from his researches on the structure and blood supply of the brain. But he is superior in many ways to his Flemish contemporary. His observations on the phenomena of disease and the action of drugs are second only (in that age) to those of Sydenham; his speculations on the part played in pathology by the nervous system or "animal spirits" anticipate some of the best results of the Vitalistic school, and his chemical theories, though necessarily imperfect, are less shallow and one-sided than those of Sylvius. According to Willis, the processes which take place in the animal organism are forms of "fermentation," which he defines as "an internal motion of the particles of any body, tending either to the perfection of the same body or because of its change into another," in short, what we now call "metabolism". Health and disease depend upon the normal or abnormal course of these fermentations, and the physician may be compared to a brewer or vintner, whose business is to watch the process, and to prevent or correct any irregularities. But Willis and his writings hardly received the attention they deserved, for the countrymen of Harvey and Newton were less attracted by chemical theories than by the rival doctrines of the so-called mathematical or mechanical school of which we must now give a brief outline.

NOTES.

Sylvius, *Opera Medica, Editio Nova*, Trag. ad Rhen., 1695. His letter

on clinical teaching is from Daremberg, *Histoire des Sciences Médicales*, i. 571; Willis, *Remaining medical works of*, Englished by S. P., London, 1681. For his biography see the *Asclepiad*, 1892.

LIV.—THE IATRO-MECHANICAL SCHOOL.

WHILE the doctrine of the Iatro-chemists, starting from its centre in the Netherlands, blended in the schools of France and Germany with the remains of Galenic and Paracelsic theories, there arose in Italy and England a rival medical system, based upon the more advanced and exact sciences of mechanics and mathematics. This school, variously called the iatro-mathematical, iatro-mechanical, iatro-physical, or physiatric, was a direct product of the new scientific spirit, and its most important precursor was Santoro Sanctorius, professor at Padua, and the friend and colleague of Galileo. Sanctorius passed much of his life seated in a chair-like weighing machine of his own invention, by means of which he discovered the so-called "insensible perspiration," and found to his amazement that this imperceptible loss exceeds in amount all the other excretions combined. He published the results of countless experiments on himself in his *Medicina Statica* (1614), a work which, though it naturally attributes an excessive value to the new discovery, was of great use in pointing out the hygienic importance of the skin, in encouraging the introduction of diaphoretic medicines, and above all, in showing that the rules of exact science might be applied to some departments of physiology. He expresses a wish that every one, or at least every physician, could have a similar machine, for not only are changes in weight among the earliest signs of approaching illness, but by taking his meals in such a chair a person would be guarded against irregularity in the quantity of his food, which is one of the most fertile causes of disease.

Sanctorius further invented many ingenious instruments,

in devising some of which he was doubtless assisted by his colleague, the famous professor of mathematics. Thus his thermometers, which he declares will be invaluable in cases of fever, are imitations of the air and water instrument invented by Galileo (1597), slightly altered in shape to adapt them for being held in the mouth or applied to the skin. So, too, his "pulsilogium" is an application of Galileo's principle of the pendulum to measure the rate and regularity of the pulse. But we also find a trocar and cannula, "by which an opening may be rapidly made in the windpipe when suffocation is imminent, especially in infants," and which may also be used for tapping the abdomen in dropsy; a vessel resembling a bronchitis kettle, for distributing steam, narcotic vapours, and cooling odours in the sick-room; and, finally, cupping glasses, fitted with exhausting syringes, described and figured at least twenty years before Guericke is supposed to have invented the air pump. Sanctorius, however, had no idea of establishing a new system of medicine, but rather intended to give more exactness and stability to the old Galenic theories. He belonged, in short, to the pre-Harveian age, and he concealed his most ingenious suggestions in a work where few were likely to look for them, a commentary on the *Canon of Avicenna*. But his other book, the *De Medicinâ Staticâ*, had a great effect, and when the discovery of the circulation showed that the most typical of vital processes might be compared to a hydraulic system, even sober-minded physicians began to fancy that the Cartesian doctrine, that the body is a machine and physiology a department of physics, might not be unjustified.

The first attempt to solve the problems of life and disease on these principles was made by Borelli (1608-79), in his famous work, *On the Motion of Animals* and, as far as the title is concerned, it was a brilliant success. He showed that walking, swimming, flying, etc., are mechanical processes in which muscles and bones play the part of strings and levers, and that the forces used can be estimated mathematically. But when he proceeds to more abstruse

physiological and medical questions, he is less fortunate, and, like Sylvius, bases his whole system upon an error. Borelli declares that muscles, when in action, are increased in bulk, and that their activity is due to a rapid fermentation or explosion caused by the mixture of a drop of nerve fluid with the blood in the muscle. "For Willis has shown that an effervescence occurs when fresh blood is mixed with various liquids." The heart acts in the same way, and expels the blood not so much by contraction as by a swelling up of the walls of the ventricles, just as a bullet is shot from a gun by the expansion of the powder, and the forces employed are not dissimilar, for Borelli calculates that each heart-beat overcomes a resistance equal to 180,000 lb.! He then applies the theory to the explanation of fevers. Such affections are not due, as the "chemists" assert, to an acid, alkaline, saline, or sulphurous state of the humours, for we may drink liquids of those kinds to any amount without causing fever; besides, "I saw at Pisa oil of sulphur injected into a dog's veins, and he was none the worse for it". Nor is abnormal heat the primary symptom, as the Galenists say, for it is itself a result of the increased cardiac activity and more rapid circulation of the blood. This Borelli attributes to some change in the nervous fluid, to explain which he adopts Wharton's theory that the glands are the excretory organs of the nervous system, and so finally concludes that the proximate cause of fever is a blocking up of the minute pores of these glands by some viscid substance. Fevers are to some extent self-limited diseases, for the increased blood flow tends to wash away the viscid matter and thus free the glands; and the alternate accumulation and removal explains the intermittences so common in febrile disorders. The rules of treatment are readily deducible from the theory. The physician should for the most part wait upon Nature, but he may do some good by giving fluid diet to dilute the humours, and by administering drugs such as nitre, which appear to dissolve glutinous substances, to restore the "tone" of the solids. Bleeding,

though so often employed, is contra-indicated, for the *materies morbi* is not in the blood but in the nervous system, and Borelli concludes: "If this theory of fever is not false and utterly out of the way, I doubt not that ingenious physicians will soon discover more certain remedies".

One of the most famous followers of Borelli was Lorenzo Bellini, for thirty years (1663-93) professor at Pisa, during which period he published numerous works expounding and defending the doctrines of the mechanical school of medicine. Perhaps the most interesting and original part of his teaching is his theory of local stimulus, or, as we now call it, counter-irritation. The iatro-mechanics held that the great causes of disease are alterations in the elasticity or "tone" of the solids, or in the density of the fluids, which hinder the free movement of the latter, and give rise to local congestions or stagnation. One way of dealing with such a state is by bleeding, especially from an artery, which, as Bellini is at great pains to prove, tends to increase the velocity of the circulation. But he considers that the same end may often be attained by local stimulus, by cautery, blisters, rubefacient lotions, flagellation, etc. These agents produce a local contraction of the fibres, whereby the fluids are expressed from one part to another, while at the same time the local blood flow is accelerated, and tends to wash out any morbid matter.

How completely the minds of the mechanical physicians were dominated by Harvey's discovery may be seen in the works of the chief British representative of the school, Archibald Pitcairne, the friend of Bellini, and tutor of Boerhaave. The following are the fundamental definitions with which he commences his *Elementa Medicinæ Physico-Mechanica*. Life is the circulation of the blood. Health is its free and painless circulation. Disease is an abnormal motion of the blood, either general or local. Like the English school generally, he is far more exclusively mechanical than are the Italians, and will hear nothing of ferments or acids even in digestion. This, he declares, is a purely mechanical process due to heat and pressure, the wonderful

effects of which may be seen in Papin's recently invented "digester". That the stomach is fully able to comminute the food may be proved by the following calculation. Borelli estimates the power of the flexors of the thumb at 3720 lb., their average weight being 122 grains. Now, the average weight of the stomach is 8 oz., therefore it can develop a force of 117,088 lb., and this may be further assisted by the diaphragm and abdominal muscles, the power of which, estimated in the same way, equals 461,219 lb.! Well may Pitcairne add that this force is not inferior to that of any millstone. Indigestion is due either to paralysis of the stomach, which is very rare, or to the presence of a viscid substance on its surface and between its fibres, preventing their proper contraction. The treatment indicated is to give purgatives or drugs which will remove this viscosity, and he recommends, among other things, the *Elixir Proprietatis* of Sylvius.

The calculations of the British iatro-mathematicians, however, were not always so wild as those of Borelli and Pitcairne. Thus Keill estimated the force of the heart beat at from five to nine ounces, while he also repeated and corrected some of the observations of Sanctorius. Another member of the school, Dr. Edward Barry, thought that the probable length of life might be calculated mathematically, on the supposition that the heart is a clock-like machine set to beat so many times. Suppose, for example, a person be endowed with an organ which will last seventy years, at an average rate of sixty beats per minute, then, if by excesses and excitements he increases the rate to seventy-five beats, he will live, excluding accidents, exactly fifty-six years.

But, with all their love of calculation, the disciples of Borelli soon saw that it was absurd to apply the strict rules of mathematics to the varied and complicated phenomena of disease, and so began to separate their theory from their practice, following in the latter the principles of a rational empiricism; and so marked is this distinction in the works of the two greatest members of the school, Baglivi and

Boerhaave, that they may fairly be classed with our own Sydenham among the clinical or Hippocratic physicians of the age.

NOTES.

Sanctorius, *Ars de Staticâ Medicinâ*, Venice, 1614; *Commentaria in Primam Fen Avicennæ*, Venice, 1646; Borelli, *De Motu Animalium*, Rome, 1680; Bellini, *Exercitationes Duæ Physicæ*, Leyden, 1711. The first of these contains the description of the tubules of the kidney, which has immortalised his name (ducts of Bellini). But the tubular structure of those organs had already been pointed out by Eustachius, 1565. *Opuscula Aliquot ad Archibaldum Pitcarnium*, Leyden, 1714. Pitcairne, *Opera Omnia*, Hague, 1722.

LV.—THE CLINICIANS.

In the preceding chapters we have seen how able physicians, led astray by love of system, attempted to replace the ruined fabric of Galenism by new edifices based upon the still but half-solidified foundations of physics and chemistry. We shall now see how others fell back upon an older and a better model, and how the banner of the Hippocratic medicine, unfurled in England by Thomas Sydenham, was carried to Italy and Holland by his admiring disciples, George Baglivi and Hermann Boerhaave.

The praises of Sydenham (1624-89) have been recorded by so many able writers, and his works are so readily accessible, that he may be here discussed more briefly than his merits would otherwise demand. The first and greatest of these merits was that he not only repeated the Hippocratic dictum that medicine depends not on theory but on observation, as Sylvius and others had done before him, but that he also carried it out in practice. Thus, to take the example which most impressed his contemporaries, he substituted for the old treatment of fevers by purgatives and sweating, with the view of getting rid of a supposed morbid humour, the antiphlogistic method of cooling drinks, fresh

air, and venesection as being most in accordance with Nature and experience. The progress of medicine may, he thinks, be furthered in three ways: (1) By accurate descriptions or natural histories of diseases, written without any pre-conceived idea, separating them into their various species, and distinguishing the essential from the accidental symptoms; (2) by establishing a fixed principle or method of treatment, founded upon experience; (3) by searching for specific remedies, which he believes must exist in considerable numbers, though he admits that the only one yet discovered is Peruvian bark. Sydenham holds that diseases are as typical and distinct from each other as the various species of plants and animals, which they resemble in appearing and disappearing with the seasons; and though he believes with Hippocrates that they are efforts of Nature towards a cure by the elimination of morbific matter, he compares them at the same time to parasites which develop in man owing to some change in his humours, just as, to use his own simile, mosses, mushrooms and mistletoe grow on trees, the juices of which have been corrupted by some internal or external agency. The progress of medical knowledge has shown that he exaggerated both the number of specific remedies and the specific nature of disease, and this is still more the case with his favourite doctrine of the "epidemic constitution," which he borrowed directly from Hippocrates. According to Sydenham, acute diseases, especially those of an epidemic character, while differing from one another in special properties, present a general type which varies from time to time, not through change of climate or season, but "because of certain secret and inexplicable alterations in the bowels of the earth," and a knowledge of the existing type is of fundamental importance in treatment. Thus in 1661-4 the "epidemic constitution" had ague as its basis. In 1665-6 came the plague, during which all febrile diseases, pleurisy, pneumonia, etc., assumed a plague-like character. The years 1666-9 were marked by a *Constitutio variolosa* when small-pox gave what we may

call the key-note. This was followed by the *Constitutio dysenterica*, and so on.

The above theory, though perhaps not entirely false, did great harm, for it became the fashion to ascribe excessive mortality of any kind to a "genius epidemicus," "cosmo-telluric miasm," or mysterious influence, sometimes confined to a single hospital ward, at other times spreading itself over whole countries, a doctrine which not only saved the physician the trouble of further investigation, but also excused his want of success, for what can mere mortals do against cosmo-telluric influences and epidemic genii? But we need not dwell on the unavoidable errors of a great man, and the influence of Sydenham's teaching as a whole was as beneficial as it was extensive.

Chief among his pupils, in spirit, if not in fact, were Baglivi (1668-1707) and Boerhaave (1668-1738). The former, who flashes like a bright meteor across the horizon of medical history, has been called an Italian Sydenham, and had he lived, would doubtless have merited the title; but he may be better compared with Bichat, whom he closely resembled in his wonderful activity and early death, as well as in the style and nature of his teaching. Having studied at Naples, and graduated, perhaps, at the ancient University of Salerno, Baglivi went round the schools and hospitals of Italy to observe the state of medical teaching and practice, lingering especially at Bologna, where he attended the lectures of Malpighi, then the greatest of living anatomists. He published the results of his observations and experience in his *Praxis Medica*, and was soon afterwards elected professor of anatomy at Rome, and, what he considered a still higher honour, foreign member of the Royal Society, in succession to Malpighi, 1697. His few remaining years were spent in the continuous labours of teaching, research, and practice. He lectured twice daily in anatomy, besides giving instruction in chemistry and medicine. He devoted much time to experimental physiology, which he declared was the source of all the chief discoveries of the age, and he

never went to bed until he had written an exact account of the condition of each of his numerous patients. This excessive activity gave rise to several illnesses, and probably hastened his death (June 17th, 1707), at the early age of thirty-eight.

Baglivi has left us two important works, the *Praxis Medica* and the *De Fibra Motrice*, devoted respectively to the art and science of medicine. The latter is of much value, and gave origin to the so-called "solidar" pathology, but space only permits some brief extracts from the former, one of the most interesting books of the seventeenth century. Here are a few of the aphorisms in which it abounds: "The physician is the servant and interpreter of Nature". "Medicine consists entirely in observations." "The healing art is not a product of human speculation, but is the daughter of Time." "If anywhere, certainly in medicine, is it required to know much, and to do little, especially in acute and complicated cases, and we should try to remove the prejudice of many patients who think their cure depends on the amount and variety of the drugs given them." "The old proverb, 'Order the bricks to the line, and not the line to the bricks,' applies exactly to physicians, who must adapt their theories to that immutable plumb-line suspended in the universe by the hand of God, even the laws of Nature, which will not deviate a hair's breadth to suit our fallacies."

The following shows what a change had come over the aspect of medicine since the time of Harvey: "Most writers on medicine for the last forty years follow Paracelsus and Van Helmont in deriding the works of the ancients; and especially do they abuse Galen, as though he were the most abandoned villain that ever lived. But at the same time they imitate the chief error of the Galenists in setting up new idols in the form of systems, which they declare are the only true ones, and as much harm is likely to be done by ascribing infallibility to Van Helmont's assertion that bleeding and purgatives are always injurious, as the old Humoralists did by their excessive employment."

One of the chief hindrances to progress in medicine is, says Baglivi, the love of system making. Both "chemists" and "mechanics" have put forward ingenious theories as to the nature of fever, but without the slightest practical effect upon its treatment, which has in the meanwhile been almost revolutionised by the careful clinical observations of "Thomas Sydenhamius artis nostrae ornator et ornamentum". Though Baglivi holds with Hippocrates that prognosis is higher than diagnosis, since it is better to know what is likely to become of a patient than to be able to give a correct name to his disorder, he still maintains that the latter art is too much neglected, and he especially attacks the rough and ready division of fevers into simple and malignant. As some aid towards a better classification he describes what he calls mesenteric fever, an acute epidemic disease common at Rome, and characterised by inflammation of the intestine and mesenteric glands. It runs a prolonged course, rarely presents any definite crisis, is in no way benefited by bark, and demands a patient, temporising and expectant treatment. The medical reader will have no difficulty in recognising the first clear description of what is now called typhoid or enteric fever. The following is Baglivi's estimate of the medical value of three important beverages then recently introduced: "Excessive coffee drinking causes headache, sleeplessness and tremor. I saw two patients so affected, who immediately recovered on leaving off drinking it. Speaking of coffee I may notice in passing that it is a sovereign cure for after-dinner headache. I have observed this in numerous patients at Rome, and also in my own case; for through excessive study and the labours of practice I got an indigestion, with headache and heaviness, about three hours after dinner, so I took three cups of coffee, which acted like a charm. I also tried tea and chocolate, but with less effect. Tea, however, is useful in headaches from other causes, especially nervous; while chocolate tends to increase the quantity of blood, and is a nutritious tonic for the debilitated. But its excessive use may cause

plethora and a liability to inflammatory disorders and apoplexy, whence, perhaps, the frequency of those diseases in our days." Baglivi applies the Baconian apologue of the ant, the spider, and the bee to the various medical sects. "The ant, who gathers food at random and uses it immediately, is a type of the empiric who goes hither and thither collecting facts, and applies them at once, untested either by the touchstone of experience or the crucible of reason. The spider, who spins her whole web out of herself, represents the theorising doctors, the pure dialecticians of science. The bee does better than either, for she gathers the crude honey from the flowers, introduces it into her own organism, and there brings it to all the perfection of which it is capable. But if you look for physicians who act like her you will find none." The medical historian, however, may fairly point to Baglivi himself as an example of this best type of physicians, for he has not only left us the nutritious honey of his teaching, both practical and theoretic, but he improved the few bright hours allotted to him with a diligence worthy of our highest admiration.

Hermann Boerhaave, though born only a few months after Baglivi, survived him thirty years, during most of which he held an unrivalled position as the medical teacher of all Europe. The beauty of his personal character which made him the idol of his pupils, the number of the latter which necessitated pulling down the walls of Leyden to make room for them, his fame which spread from China to Peru, and his receipt of a letter from a Celestial correspondent, addressed to "Boerhaave in Europe," are among the commonplaces of medical history. But we must here confine ourselves to a short account of his teaching, and its influence upon the progress of the healing art. Boerhaave's *Aphorisms* and *Institutes*, once the universal test-books of medicine, are now utterly forgotten, and the cause of their former success must be sought, not in any new and important discoveries or theories they contain, but in the prestige of the writer's name, in the clearness and simplicity with

which they are written, and in the eclectic character of their teaching, in which the doctrines of the mechanical school are mingled with the "solidar pathology" of Baglivi, together with smaller proportions of the chemical and humoral theories. According to Boerhaave the body is composed of solids in the shape of "fibres" and vessels, and of fluids contained in the latter, and acted upon by them according to the laws of hydrostatics. Health consists in the normal action and reaction between the solids and fluids; in disease the fibres may either be relaxed, giving rise to passive congestions, or constricted, so as to produce obstruction and suppression of secretions, while in the other cases there may be an abnormal acridity of the humours, or their circulation may be impeded by an excessive viscosity. Respiration, he considers, is a purely physical process, the pressure of the air in the pulmonary vesicles serving to complete the mixture of the blood with the chyle, and so to preserve its proper fluidity. He is puzzled, however, by the fact that death occurs if the air is not continually renewed, and asks: "Does the elastic part of the atmosphere get absorbed, or is it the hidden aliment of life as the alchemists suppose? This is a very difficult question." One of Boerhaave's chief services to medicine was his emphasis of its positive or scientific side, in contrast to the abstract philosophic theories which so abounded in the eighteenth century. "Every vital action (he says) depends on certain bodily conditions and relations; every change in these bodily conditions and relations is necessarily followed by a corresponding change in the vital activity; medicine, therefore, must be based upon physiology." This doctrine was further developed by his illustrious pupil Von Haller, and afterwards by Bichat, and produced, as we shall see, most important results. Equally valuable was his clinical teaching, in which he carried on and extended the work of Sylvius, and which was afterwards transplanted to a wider theatre by his pupils, Van Swieten and De Haen, the founders of the so-called "first Vienna school". Unfortunately, only his more theoretical lectures have sur-

vived, and those in very imperfect and unsatisfactory versions; but Haller has collected and edited a few "Consultations," which give us a somewhat better idea both of his clinical skill and of his never-failing kindliness and courtesy. The following is the first of these, slightly condensed:—

Letter from the local practitioner. "Your aid, Vir spectatissime, is implored by Mrs. W——, aged thirty-one, of a family very liable to phthisis. Her extreme thinness, general prostration, feet swollen in the evening, etc., clearly show that the fibres are too relaxed. Till her twentieth year she enjoyed good health, when an acute fever gave rise to chlorosis, and all that heap of hysteric symptoms to which poor women are liable, especially headache and mental depression. Over-sedulous doctors did not hesitate to treat this by large venesections, at least six times repeated. Hence she got a cough, which has increased during the last seven years, and which she has innocently but imprudently encouraged by late hours and nocturnal dances. She is not gluttonous nor addicted to spirituous liquors. She complains of occasional constriction of the chest with slight pain. There is a little expectoration with the cough, increasing on suppression of the natural perspiration. She has had one or two hectic flushes, and is gradually losing flesh. She married at twenty-six, and had a daughter three years later. During pregnancy her face was covered with blotches which have not yet entirely disappeared. Adieu, most learned sir, and humanely impart the method of treatment you consider most promising, which will doubtless result in the benefit of this poor lady, and the increase of your own reputation."

Boerhaave's reply. "I have considered this case, which has been wisely observed, exactly described, and hitherto prudently treated by you. I am compelled to think that the cause of the evil must be sought in the excessive feebleness of her bodily structure, and especially in a weakness of the pulmonary tissue. Wherefore, I consider that all evacuative and debilitating treatment should be avoided. I

earnestly advise the use of tonics, friction of the body, suitable exercise, nutritious and easily digested food, etc., and I add these few medicines. Let her take three of the pills A every three hours, and then one ounce of the medicated wine B, if possible on an empty stomach. I would suggest that this treatment, if it commends itself to your judgment, be continued for two months; but use your own authority, excellent and learned sir, for correcting this, for you are fully competent. Condescend to inscribe me on your list of friends. Farewell". A.—Assafœtida, half a drachm; catechu, mastich, frankincense, balsam of Peru, extract of liquorice, each one drachm; divide into pills of three grains each. B.—Iron filings, sandalwood and various aromatics, in French or Portuguese wine.

The doctrines loosely combined by Boerhaave were condensed into a definite system by Frederick Hoffmann of Halle (1660-1742) who forms a link between the mechanical and vitalistic physicians. He supposed that the universe is pervaded by an etherlike "vital fluid," which exists in a specially active form in the nervous system of animals, and through it acts upon their muscles both voluntary and involuntary, keeping them in a state of partial contraction or "tonus". The same fluid exists also in the blood; "the cause of life is the circulation of the blood; the body lives so long as the blood and humours are in motion, if they stop there is death". Disease is "a marked disturbance in the movements of the solids and fluids". In these disturbances the solids are the active and the fluids the passive agents. Excessive movement produces "spasm" and defective "atony," either of which may be general or local, and most acute diseases are due to spasm, most chronic diseases to atony. This theory reminds us of the ancient Methodism; but Hoffmann also admits that disease may be due to alterations in the humours, and especially to a gradual thickening of the vessels which tends at once to hinder their free circulation and to prevent the excretion of waste products. This, indeed, is the direct cause of old age and natural death. We thus get

four main sources of disease, spasm, atony, altered humours and deficient excretion, to be met respectively by four kinds of medicines, sedatives, tonics, alteratives and evacuants. Pure water is an excellent medicine, it relieves spasm and favours the motion of the humours; but the great antispasmodic is camphor, though not without danger, as evidenced by the following case. A person took two scruples of camphor by accident. He was seized with extreme and continued vertigo, coldness of the limbs and delirium. Hoffmann administered aromatics and ammonia; but the patient got worse with rigor of the limbs and spasm of the œsophagus. Finally he recovered by the use of enemata, alcohol and "spirits of ether," which last formed the famous "Hoffmann's anodyne," still in use. His favourite tonics were wine, quinine and preparations of iron, while among alteratives and evacuants prominent place was held by mineral waters, the composition of which he made laudable efforts to analyse and imitate. The simplicity and plausibility of these doctrines made them very popular, and they formed the basis of most of the more practical "systems" of the eighteenth century.

NOTES.

Sydenham's works were published in Latin and English by the Sydenham Society, 1844 and 1849 respectively. The latter contains a biography by Dr. Latham. Among the very numerous estimates of his services to medicine, the late Dr. John Brown's *Locke and Sydenham* (in his *Horæ Subsecivæ*) is especially noticeable.

Baglivi, *Opera Omnia Medico-Practica* (by Pinel), Paris, 1788; Dr. Max Salomon, *Giorgio Baglivi und Seine Zeit*, Berlin, 1889. Bœrhaave, *Institutiones Medicæ*, Leyden, 1713; *Aphorisms*, Leyden, 1715; *Prælectiones Academicæ*, Göttingen, 1739; *Consultationes Medicæ*, Göttingen, 1752. There are numerous English biographies, from that by Dr. Johnson to the one by Sir B. W. Richardson, *Asclepiad*, 1885. Hoffmann, *Opera Omnia*, Geneva, 1748, especially the "Commentary on the difference between his own system and that of Stahl" (*Commentaria de Differentia*, etc., Frankfort, 1746), which contains a very clear and impartial outline of the rival doctrines.

LVI.—SEVENTEENTH CENTURY SURGERY.

THE surgery of the seventeenth century is much less important than that which came before or after it, for the wonderful progress of physiology seems to have attracted the ablest minds to the study of medical problems, just as the anatomical discoveries of the preceding age gave birth to the great surgeons whose work has already been considered. Still there are some names which cannot be entirely omitted.

Richard Wiseman, though scarcely an Ambrose Paré, is in some sense the father of English surgery. After gaining much experience in the naval service, he joined the Royalist army in the West about 1645, and found the soldiers much troubled by an epidemic of scabies. "I commonly let them blood which fell under my care, and advised them to drink for their morning draughts brimstone and milk, and to anoint themselves with brimstone and butter. But in warm weather frequent bathing in the rivers was their cure." He afterwards became sergeant-surgeon to Charles II. But Wiseman's life and works have been so recently and fully discussed by two distinguished members of our profession that we may here dismiss him with Haller's estimate: "A man of much experience, sincere and not ashamed to confess his mistakes, not careful about the subtleties of the art, rather too fond of medicaments, and too sparing of operations".

The chief Italian surgeons of the century were Peter Marchettis (1589-1675), professor at Padua, and Marcus Aurelius Severinus of Naples (1580-1656). The following case, taken from the *Observations* of the former, shows the exaggerated ideas as to the danger of suturing divided tendons, a dread which was finally removed by Haller's experiments on animals in the following century.

"Nerves and tendons must never be sutured, for this practice is often followed by fatal tetanus. The ingenious surgeon should rather remedy deformities by appropriate

splints, as I did in the case of a distinguished marshal of France, of the family of Montmorency. He received a sword cut on the right wrist, dividing the extensor tendons of the thumb. When the wound healed the thumb was drawn across the palm of the hand, so that he could not hold sword, dagger or lance, and was entirely incapacitated for the profession of arms, apart from which he declared life was not worth living. So he consulted me about amputating his hand, to which I could in no wise consent, but devised an iron case to hold the thumb out, fixed by two cords to bracelets round the wrist, and so he was able to hold and use all kinds of weapons.

"Traumatic epilepsy cured by trephining: I was once called in consultation with Dr. Julius Sala, professor at Padua, to a patient who had been struck on the head with a dagger, with lesion of the skull, membranes, and brain itself. The wound healed externally, but was followed in three or four months by recurrent epileptic attacks. On introducing a probe I found the above-mentioned penetrating wound. I therefore enlarged the opening with a trephine, letting out much yellow ichor, and in thirty days both the wound and the epilepsy were completely cured.

M. A. Severinus is especially interesting as the last important representative of the school of Salerno. He became superintendent of the hospital for incurables at Naples, and achieved such popularity that when obliged to flee from the town, owing to some dispute with the Holy Inquisition, he was recalled by the unanimous voice of the citizens. In his work on surgery, or, as he calls it, "efficacious medicine," he blames his colleagues for their timidity, and for substituting drugs and balsams for operations, a degeneration which (he says) is largely due to the influence of the Paracelsists. Even mediæval surgeons were bolder than they; Peter of Argellata, for instance, resected the whole of the radius for necrosis, a feat which few would attempt in his time. Another interesting treatise deals with "the nature of abscesses". Cold or chronic abscesses which are sometimes

connected with the spine should, like all others, be opened as early as possible, but in their case there is a special liability to putrefaction, and to guard against this the operation should be performed with a red hot knife (*scalpro candente*).

The name of Scultetus of Ulm (1595-1645), who distinguished himself by his ingenuity in devising artificial limbs, eyes, noses, and surgical instruments, is still remembered by a bandage which he invented, and he has left us many "observations" which throw light upon the practice of his time. He was a bold operator even in his younger days. "While I was studying medicine in Padua, a noble undergraduate suffered for some months from a swelling of his left hand, which was not benefited by general or local treatment, and began to ulcerate in the palm. So we consulted the illustrious Spigelius (1578-1625) who, putting a probe in the ulcer reached carious bone, and said it was *spina ventosa*, an incurable disease, which attacks bones first and corrodes them without affecting the periosteum, or causing pain; then it forms a slightly painful swelling, and after some months the part ulcerates. I obtained permission of the patient and amputated his hand below the carpus. The metacarpals were corroded, but still covered with periosteum, except where the ulcer was." Scultetus was as fond of his lancet as of his amputating knife. "The blood, which that new Atlas of Nature, Harvey, has shown to be the chief principle of the microcosm, is so precious a fluid that the Creator has revealed to man that the souls of animals are in their blood. Wherefore the Paracelsists, Helmontists, and other hæmophobes, banish phlebotomy from the medical republic as useless and noxious, and upbraid the practisers of venesection as sellers of souls (*animarum negotiatores*). Which error, though long ago exploded by the universal experience of mankind, may be still further refuted by the venesection history of Guinanda Andrews (*Andreæ filia*). This virgin, now aged sixty-two, has passed all her life in the female orphanage and alms-

house, and from her ninth year has laboured under many infirmities, accompanied by great swelling of the abdomen. About her fifteenth year, when youthful wildness is most rampant, she frightened another girl with a cat, and the latter in revenge got a spider, of which animal she had a peculiar horror, and so terrified her therewith that she fell down in a fit, lasting nine days. Liberal venesection was employed, and forty-five cupping glasses applied to her spine and legs, thirty-six with scarification, according to the Hippocratic rule "extreme diseases demand extreme remedies". On the advice of an old woman, skilled in disorders of females, her feet were also scarified. So she recovered, but has ever since been liable to a hysteric affection, which takes her suddenly, even when eating or singing, and leaves her with equal rapidity. To preserve her health, and cure these fits, she has been bled during her life more than 700 times, not to 3 oz. or 4 oz. only, but to 12 oz., 16 oz., or more, and that daily, though now on account of her age it is done less frequently. The cause of such a plethora of blood is probably hypertrophy of the liver, but we may be able to investigate it more deeply *post mortem*."

The figure of Nicholas Tulp (1593-1678) is widely known from Rembrandt's famous picture "The Anatomists"; he holds an honourable place in general history as the aged burgomaster whose intrepid patriotism prevented the surrender of Amsterdam to the French, 1672, and he deserves mention here as a skilful surgeon, whose small volume of *Medical Observations* has been called by Haller a "golden work" (*aureum opus*). The following are extracts therefrom:—

"A distinguished painter, troubled by melancholia, thought that all his bones were soft like wax, and that his body would roll up in a ball if he moved, so he stayed in bed for a whole winter. I determined not to contradict his delusion, but to use a stratagem, and told him the disease was well known to physicians, and could readily be cured, so that, if he took the medicines prescribed, his bones would

become hard in three days, and he would walk in a week. Then I gave him some simple purgative, and on the third day allowed him to sit up, but by no means to walk, doing it gradually so that he might not suspect the stratagem. By the sixth day he was perfectly well; he overwhelmed me with gratitude, and ever after had the greatest confidence in medicine. For he never discovered the trick, though no fool in other matters and hardly second to any in his art." On another page he tells the story of a blacksmith who performed the operation of perinæal lithotomy on himself, and successfully extracted a stone weighing 4 oz. and larger than a hen's egg, with no other instruments than a common knife and his fingers; a deed which, says Tulp, may compare with the most valiant acts recorded in history. Tulp strongly disapproves of the increasing habit of writing medical books in the vulgar tongue instead of in Latin. It will, he thinks, cause a marked increase both of real and imaginary diseases, and as an example of this he relates how a patient of his own; who had fractured and dislocated his fibula, got hold of the works of Ambrose Paré, and applied his description of the various disasters which may follow a fracture of the thigh bone to his own case. By perpetual anxiety and brooding thereupon he became sleepless, and finally went out of his mind.

NOTE.

Wiseman, *Eight chirurgical treatises*, London, 1734; Longmore, Sir T., *R. Wiseman*, London, 1891; Richardson, Sir B., *Wiseman and the Surgery of the Commonwealth*, Asclepiad, 1886. Marchettis, *Observationes Medico-Chirurgical*, Padua, 1664. Severinus, *De Abscessuum Naturâ*, Frankfort, 1643; Severinus, *De Efficaci Medicinâ*, Frankfort, 1671. Scultetus, *Armamentarium Chirurgicum*, Leyden, 1693; Tulp, *Observationes Medicæ*, Amsterdam, 1685.

LVII.—THE ANIMISTS.

THE eighteenth or philosophic century, as it has been called, is marked in medical history by the rise and fall of a number

of philosophic theories and systems, and by a revival of that Platonic mysticism which we have more than once noticed as the evil genius of the healing art. We find abstract expressions treated as though they were real existences, and attempts made to solve the problems of life and disease by such terms as "vital principle," "excitability," and "polarity," explanations no more scientific and much less poetical than that of thunder as the voice of Jove, or diseases as the arrows of Apollo.

The chief exponents of the so-called vitalistic systems of medicine may be divided into two classes, a metaphysical and a scientific. The former held that the body is composed of passive or "dead" matter, and is inhabited by a mysterious immaterial being called "life," which acts upon the body as it were from without, and separates from it at death. And they may be sub-divided into two sections: (1) the animists, who identified this life with the soul, and (2) the pure vitalists, who maintained the existence of a second mysterious entity, the "vital principle". In contrast to both of these, the organicists (as they may be called) taught that vital activity is the result of the intimate structure of organic matter—that life, in short, is the effect not the cause of organisation; but they differed from the materialists of the preceding age in holding that vital forces are entirely separate from, and in a sense superior to, those of physics and chemistry. Space only permits us to consider, in the present chapter, the typical representatative of the first subdivision of the former class, George Ernest Stahl, professor at Halle, a name equally famous in the history of medicine and of chemistry.

Stahl (1660-1734) whose deep piety and considerable genius were clouded by an unfortunate temper and an obscure style, tells us that when he began to teach there were no doctors, "for medicine is the science of life, and we have now only mechanics and chemists". "I deny (he says) that chemistry has anything to do with medicine". "Where the physicist ends, the physician begins," and he even

declares that anatomy, except in its broad outlines, is useless to the healing art. The animal body consists of highly putrescent substances, but does not putrefy while alive. Life, therefore, is something which resists putrefaction; and it does this, according to Stahl, by keeping the blood, the most putrescent part, in continual motion, and by expelling whatever is beginning to corrupt by the secretions and excretions. Motion in itself is immaterial, and presupposes an immaterial agent, and Stahl declares that the source of all vital movement is nothing else than the soul, which builds up the machine of the body, and maintains it for a time against external influences. The hypothesis of a special force called nature, pneuma, archeus, etc., is an old wives' fable (*antiqua nænia*), for if unintelligent, how is it superior to mere mechanism, if intelligent, why distinguish it from the rational soul? The objection that spirit cannot act upon matter without some intermediary refutes itself, for this intermediary must be spiritual or material: in the first case it cannot act upon the body, in the second it cannot be acted on by the soul. He then supports his own theory by a great array of facts showing the close connection of mind and body, some of which will readily occur to the reader, and which might now-a-days be considerably extended, for the "anima" of Stahl closely resembles the sub-conscious personality of modern hypnotism.

One of the difficulties of animism is the explanation of natural death. The substance of the body is continually renewed; if the force behind it is an immortal soul, why should it not go on for ever? Stahl faces the problem boldly; he declares that the immediate cause of death is not disease, but the direct action of the soul, and he quotes with approval the curious expression of Seneca: "You die not because you are ill, but because you are alive". The soul leaves the bodily machine either because it has become unworkable through some serious lesion, or because it does not choose to work it any longer; but he attempts to justify this suicide by asserting that the tendency to

putrefaction increases with age, and may finally become irresistible.

As a rule, the soul tries to preserve the body as long as possible, and most so-called diseases are merely manifestations of its efforts in this direction. Such is the case, for instance, with the whole class of fevers. The natural tendency of the blood to putrefy has somehow become increased; the soul perceiving this, at once counteracts it by more rapid circulation and excretion; and Stahl observes that man is more liable to febrile diseases than are animals, because his more intelligent soul sees and guards against approaching dangers, which the stupid *animæ* of brutes do not perceive; therefore they have fewer illnesses but shorter lives. The most fertile cause of disease is plethora, which the soul relieves by natural losses of blood, by the nose in childhood, by the lungs in youth, and by the hæmorrhoidal or uterine veins in adults. The suppression of this natural loss causes headache, impetigo, and other head affections in children, pulmonary diseases in the young, and hysteria, hypochondria, renal and vesical affections in older persons. The chief source of chronic disease is the portal system, where the circulation is most sluggish, and therefore the natural tendency to putrefaction least counteracted, and Stahl wrote a special treatise, *De venæ portæ porta malorum*, on the multifarious evils of "portal congestion," long afterwards a favourite phrase with physicians at a loss for a diagnosis. But the soul is liable to error in its sub-conscious as well as in its conscious activities, and some diseases are due to a false idea or irregular motion (motus ataxiæ) on its part. It may, for instance, send an excess of blood to the lungs, and so produce congestion, stagnation, and their infallible results, putrefaction, and destruction of tissue, in short, pulmonary phthisis; a doctrine which reminds us of the "custos errans" of Van Helmont.

Stahl's therapeutics, as might be expected, were of the simplest character. The soul, in spite of its mistakes, knows much more about the body it has built up than does

the most skilful physician. The latter's chief duty therefore, is to watch and assist its efforts. Venesection and purgation are the great remedies for the numerous ills of plethora; copious water drinking dilutes the blood and favours its free circulation, and some aromatic substances may exert an antiseptic influence, and so assist the soul in its chief object of warding off corruption. But in his old age Stahl gave up even this simple medication. Fevers, he declared, are not to be treated at all unless we can discover and remove their causes. He therefore rejected quinine. Opium also is a most harmful drug for it tends to deprive the soul of its control over the body; and he finally contented himself with dosing all his patients with salt and water, which could not do much harm, and might help to counteract putrefaction.

Such, in briefest outline, were the doctrines of "animism," a system originating partly in a reaction against the materialism of the preceding age, partly in the attempt of a pious and philosophic physician to reconcile medicine and theology. But Stahl, like most conciliators, satisfied neither party. The theologians objected to the soul being degraded into a sort of sanitary inspector, who goes about the body, cleaning out drains, removing refuse, etc., and sometimes performs even those humble functions imperfectly. And they objected still more to his theory of 'natural' death. In old age there is certainly a decay of vital force, and we sometimes seem able to trace its gradual and complete extinction. To admit that this vital force is the soul would place a dangerous weapon in the hands of those who deny its immortality, and the theologians therefore treated Stahl as a Philistine, and sent out their champion philosopher, Leibnitz, to smite him. To the more materialistic physicians, Stahl's doctrine of a soul, immaterial and indivisible, without extension in space, yet present in and acting upon every part of the body at the same time, seemed the very *ne plus ultra* of nonsense; while those who cared less for theory than practice found little to attract them in a system the thera-

peutic part of which bordered upon absolute nihilism. Still the doctrine of Stahl is important if only as marking the close of a materialistic and the beginning of a metaphysical epoch in medical history, and the animists and semi-animists included many able physicians, some of whom may be mentioned in the sequel.

NOTES.

Stahl, *Observationes Clinico-Practicæ*, Leipzig, 1718; *Theoria Medica*, (new edition), Leipzig, 1827; Lemoine, *Le Vitalism et l'Animism de Stahl*, Paris, 1864; Saisset, *L'Ame et la Vie*, Paris, 1864. Dr. Pagel gives a good *Life* of Stahl in Hirsch's *Biographisches Lexikon*, but is perhaps a little hard on his followers, whom he describes as being "all of them for the most part metaphysicians, pious, God-fearing men, of extraordinary low intelligence".

LVIII.—THE VITALISTS.

IN order to bring together two closely allied medical systems, we must deviate a little from the strictly chronological order, for Paul Joseph Barthez, the foremost exponent of what may be called pure vitalism, was born in the year Stahl died (1734). Though so similar in doctrine, he presents a striking contrast to his predecessor in everything else. Stahl is the most obscure, Barthez one of the clearest of medical writers. Stahl was a metaphysician; Barthez, though he represents a metaphysical system, was a man of a decidedly practical and scientific mind. The famous chancellor of Montpellier lived during the period of the so-called Anglo-mania in France, and he prided himself upon being a disciple of the great English philosophers—Bacon, Locke and Newton. Science, he declares, has nothing to do with the essence of things, but is the study of phenomena, and medical science studies the phenomena presented by the human body in health and disease. Some

of these have their origin in the mind or will, as, for instance, the various voluntary movements. Others, such as the action of bones and joints, obey the laws of mechanics. But between these comes a third and most important class of phenomena which especially concern the physician, and which are not to be explained either by mind or mechanism. Not by mind, for we are unconscious of them; and if Stahl urges that this is due to habit, through which we also become unconscious of the voluntary acts involved in speaking, walking, or playing an instrument, Barthez replies that we can always regain this consciousness by a slight effort of attention, but no exertion of will can give us control over the circulation, digestion, or any other vital function. Moreover, the vital activities are the same in all men, but their souls or minds differ widely; a vast number of vital functions are carried on at the same time with perfect regularity, but it is characteristic of the mind that it can only give full attention to one thing at once. Against the theory that life is the result of structure or organisation, Barthez argues that a mechanism however complex is in itself absolutely passive. He points out that life may be destroyed without any apparent lesion of structure while it may survive the most severe injuries, and he remarks that if vitality depends upon a definite arrangement of particles, the fluids of the body, in which there can be no such definite arrangement, must be dead; yet there is strong evidence that the blood, if not the life itself, at any rate possesses vital properties.

Having by these and other arguments shown the weakness of opposing theories, Barthez concludes that we must assume the existence of something which is neither soul nor body, and which he calls "vital principle". Whether this vital principle is a mere property or an independent being he does not know; he compares it, in fact, to the "X" or unknown quantity of the algebraist; but he evidently leans strongly towards the latter alternative, for in discussing its final fate he supposes that it may either die with the body,

become reincarnate in some other body, or be absorbed into some universal vital principle.

The Barthezian or vitalistic pathology need not detain us, for it is simply that of Stahl and Van Helmont with a different set of names. Disease is the effort of the vital principle to resist some harmful agency, or it is due to a morbid idea "manifesting itself by alterations in sensibility, abnormal movements, or an aberration in those acts which regulate the chemical constitution of the humours," or, finally, it may be caused by excess or defect of general vital activity. But it is characteristic of Barthez that he allows his theory to have very little influence upon his practice, and his therapeutic doctrines present several interesting and original features. There are, he says, three ways of treating disease—a natural, an analytical and an empiric. The first bids us assist Nature (or the vital principle) in her efforts, as, for instance, by giving an emetic in nausea, or a purgative in some forms of diarrhœa, and the cautious physician will always employ this mode of treatment in cases where the termination of the disease is naturally favourable. But it is on the analytic method that Barthez lays greatest stress. He observes that the same affection is often benefited by different drugs, and that the same remedy is useful in many forms of illness, and he concludes from this that most disorders are compounded of several elementary affections. In such cases it should be the physician's object to distinguish these, and to attack them separately "by means proportionate to their force and influence". Thirdly, we may fall back upon the empiric method, of which there are three varieties: (1) A *méthode perturbatrice* which attempts to dissipate an existing chronic affection by substituting a more acute one, "as Sydenham, and Boerhaave after him, were wont to cure obstinate agues by exciting diaphoresis or purgation a little before the attack"; (2) a *méthode imitative*, by which the vital principle is directed into the path by which Nature usually cures similar diseases; and (3) the employment of remedies which have been found

to have a specific relation to the disease in question, or, in other words, which seem to cure the disorder without any intermediate action.

Though Barthez was far the ablest of the pure vitalists, the want of any close connection between his theory and practice makes him a somewhat imperfect representative. He repeatedly protests that he does not mean to explain anything by his "vital principle," which is simply a short way of expressing his belief that life is not the result of either bodily or mental action; and he points out that Newton had similarly used the abstract term "gravitation" as a short way of saying that all material particles tend to approach one another with a definite acceleration.

It is said that when an ancient sorcerer called up his attendant demon, the latter was wont to demand immediate work, failing which he carried off the sorcerer. So now it was with that *deus ex machinâ* the vital principle. The disciples of the French physician not unreasonably asked what was the use of assuming a vital principle at all, if it explained nothing, and just as the successors of Newton converted "gravitation" into an actual force inherent in matter, and directed its movements, so the adherents of Barthez exalted his "vital principle" into a spiritual being which resides in the body and endows it with life. They thus approach still more closely to the animists, for though it may be of great import philosophically whether we suppose that life is the soul or some other spiritual entity, the results from the view of practical medicine are nearly identical. A mind diseased, or a disordered vital principle, seems equally inaccessible to direct treatment by merely material drugs, and both animists and vitalists thus tended either to reduce their therapeutics within the narrowest limits, as was the case with Stahl, or to assume that medicines contain peculiar semi-spiritual or "dynamic" powers, enabling them to come into direct contact with the immaterial source of life and disease. The most striking example of this latter tendency is seen in the doctrines of

Hahnemann, whose system may be considered historically as a union of the extreme vitalistic theories with the mysticism of the sixteenth century. Paracelsus tells us that every substance contains a hidden quintessence or spirit of life. In man and animals this spirit cannot be isolated, for they die in the process.[1] "Wherefore no quintessence can be got from flesh and blood. If we could draw out the life of the heart without destroying it, we could maintain our lives for ever without disease, by means of this quintessence." But the spirits or quintessences of plants and minerals may be separated by the art of the alchemist, and these are the Paracelsic arcana, or specific medicines. Similarly Hahnemann holds that all drugs contain "dynamic spiritual powers," which are awaked and brought to life, not by chemistry, but by "dynamisation," "a process unknown before my time," and consisting in rubbing the dry substances in a mortar, and shaking the fluids "which is a kind of rubbing". This is not a mere attenuation, though repeated attenuations are necessary "that the rubbing or shaking may penetrate more fully into the essence of the drug, and so set free its more deeply seated medical powers, which can then act upon our life in an almost spiritual manner," and so cure diseases, for "diseases are solely spiritual derangements of the spiritual vital force which animates the human body".

NOTES.

Barthez, *Nouveaux Eléments de la Science de l'Homme*, Paris, 1858; *Oratio Academica de Principio Vitali*, Montpellier, 1774; Lordat, *Exposition de la Doctrine Médicale de P. J. Barthez*, Paris, 1818. The quotations from Hahnemann may be found in his *Chronische Krankheiten*, Dresden, 1835 (iv. 347) and *Organon*, preface, p. 10 (Dudgeon's translation).

LIX.—THE ORGANICISTS.

WE have now considered two of the three forms of medical theory which replaced the chemical and mechanical systems

of the seventeenth century, and may here briefly repeat the definition given in a previous chapter. The animists, vitalists and organicists agreed in maintaining that vital activity cannot be explained by the laws of physics and chemistry, but while the two former held that life is due to some spiritual entity residing in the body, and acting upon it like an engineer on his engine, the organicists believed that it results from the intimate structure of the body itself. The objection that mere structure without a force behind it must be purely passive may be met in two ways: (1) By replying that the active agency is to be sought not in some unknown metaphysical abstraction, but in the perpetual stimulus of external nature, or in modern phraseology, that life is a continuous series of reflex actions; and (2) by pointing out that matter and force are inseparably connected, and that even so-called dead substance possesses unknown capabilities of action which may be manifested only under special conditions. The history of organicism shows the gradual development of these two theories till they are at last clearly formulated in the systems of Brown and Reil respectively, and we may trace their common origin in the doctrine of "irritability," first taught by Francis Glisson (1597-1677), Regius Professor of Medicine at Cambridge.

Glisson, whose name is best known from his description of rickets, and his researches on the anatomy of the liver, considered that the most striking characteristic of living tissue is the way in which it responds to stimuli. This he called "irritability," distinguished various kinds and degrees of it, and attributed it not only to the solids, but even to some of the fluids of the body; life, in short, is irritability. With regard to animals, Glisson seems to have believed that irritability is an inherent property of their tissues, but he hesitated probably from theological scruples to apply the same doctrine to man, in whose case he proposed another theory, more nearly allied to that of the animists and vitalists. The irritability of the human body, he declared, is due to some semi-material substance resembling it in

shape, separable from it at death, and the special seat of the immortal soul. It is thus very like the orthodox idea of an angel, and Glisson points out that our conceptions of those mysterious beings are closely allied to our ideas of life, "for who can imagine a dead angel!"

But Glisson's theory was so vague and contradictory, and so mixed up with philosophic subtleties, that it attracted little attention till the doctrine of irritability was revived in modified form by the greatest physician of the eighteenth century, Albert von Haller. Haller made valuable contributions to almost every department of medicine as well as to other sciences, but we can only consider here his two papers *On the Sentient and Irritable Parts of Animals*, read before the Royal Society of Göttingen, April 22nd and May 6th, 1752, the most important physiological productions since Harvey's *Anatomical Exercise*. Relying upon numerous vivisections, "undertaken with great reluctance in the hope of benefiting the human race," Haller says that he has arrived at a new classification of animal structures into irritable, sentient and neutral. He points out that the two former properties are distinct from one another, and that irritability, the chief objective manifestation of life, is not only independent of sensibility, but survives for a time the death of the animal, and is shown in parts separated from the rest of the body. This was an attack both on the old theory of "animal spirits" and the modern doctrines of the animists and vitalists, and opponents sprang up on all sides, the ablest of whom was the semi-animist, Whytt, of Edinburgh. But even Whytt confesses that the experiments of Haller force us to believe either that the head, body and other parts of a frog may retain their *anima* or sentient principle when separated from each other, or "that the active powers of animals are merely properties of the kind of matter of which they are made". He prefers the former alternative as being more in accordance with theology, but a dissected soul, or chopped-up sentient principle, is even harder to imagine than a dead angel, and Whytt is driven

at last to the usual resort of the mystic, "What are we that we should presume to limit by our narrow and inadequate capacities the powers of incorporeal natures?" Haller, however, stuck manfully to his facts, and his final triumph not only settled the question as to whether the healing art was to be based on metaphysical theory or scientific observation and experiment, but through the labours of Bichat, which were its direct result, contributed largely to that revolution in medicine which marks the beginning of the present century.

Practical physicians were naturally more attracted by the doctrine of the organicists, than by vague theories which converted diseases into unknown derangements of some equally unknown "principle," and the "neuropathology" of Cullen and Bordeu may be looked upon as an attempt to combine the teaching of Haller with the older views of the "solidists," Baglivi and Hoffmann. Cullen thought that the distinction of irritability and sensibility might be removed by considering muscle as the direct continuation of nerve. Life could then be defined as a property of the nervous system or nervous energy. The causes of disease act by increasing or diminishing the excitability of this nerve force and thereby produce changes in the body, especially in the form of spasm or atony. The therapeutic indications are to remove the exciting cause, to treat the lesion produced, and to maintain the nervous energy, or, in more general language, "to obviate the tendency to death".

We must pass over Cullen's many other services to medicine to speak for a moment of one who was first his pupil and afterwards his opponent. It seemed to John Brown, M.D., St. Andrews, absurd to trouble oneself either with the observations of Cullen or the experiments of Haller when the great word "excitability," if properly manipulated, will not only explain all the phenomena of life and disease, but also afford a simple and universal rule of treatment; and he proceeded to propound a medical system, of such peculiarity and interest that we must discuss it in a separate

chapter. Stated in the fewest possible words the theory was this. The animal body possesses a property called excitability, which when acted on by stimuli gives rise to excitement, or in other words life. Moderate excitement is health, too much or too little excitement is disease which is to be treated by regulating the stimuli.

Meanwhile the progress of science, especially the discovery of oxygen, and increased knowledge of electricity, threw new light upon the capacities of so-called dead matter. The chemists and physicists returned to the attack with improved weapons and united forces, and they found an unexpected ally in John Christian Reil a pupil of Haller, whose name is immortalised in the human brain. Reil not only held that the active powers of the body are properties of its substance, but further asserted that the distinction of a special set of vital or organic forces, and another inferior set of physical and chemical forces, is untenable. Volta had shown that by arranging metallic plates in a certain order the marvellous force called electricity was developed. Why should not the infinitely more complex arrangement of matter in the human body give rise to yet more marvellous activities? Indeed, may not the body, or, at any rate, the nervous system, consist of an infinite number of voltaic piles or galvanic batteries? and Reil carried away by the closeness of the analogy finally declared that life is electricity.

His followers went still farther. The development of positive and negative electricities, at the opposite ends of a voltaic pile or battery is expressed by the term "polarity". Here was a still finer word than Brown's "excitability" for it might be applied not only to the body but to the whole universe. Irritability is positive, sensibility negative; health is positive, disease negative; man is positive, woman negative; mind positive, matter negative; and Polarity with a big "p" in some way helps to explain it all.

NOTE.

In attempting to give a clear account of the schools of medical thought discussed in this and the two previous chapters I have,

perhaps, separated them rather too sharply from one another. Many able men were ready to accept either a physical or metaphysical view of "Life," as, for example, Hunter in the well-known passage: "Life either is something superadded to matter, or else consists in a peculiar arrangement of certain fine particles of matter which being thus disposed acquire the properties of life". Even Stahl, the most extreme of the metaphysicians, is an organicist so far as plants are concerned, and holds that their vitality is the result of their intimate structure; but then he maintains that this vitality is entirely distinct from that of animals, and cannot properly be called "life" at all.

Glisson, *Tractatus de Natura Substantiæ Energetica*, London, 1672; Haller, *Opera Minora*, Lausanne, 1763; Whytt, *Works*, Edinburgh, 1768; Cullen, *Works*, Edinburgh, 1827, by Thomson, who also wrote *An Account of the Life, Lectures, and Writings of William Cullen*, Edinburgh, 1832; Spannagel, *Systemata Reilii et Brunonis*, Halle, 1798.

LX.—THE SURGERY OF THE EIGHTEENTH CENTURY.

IT is pleasant to turn from the speculative medicine of the eighteenth century to the contemporary surgery, which equalled in brilliance that of the age of the great anatomists, and was marked not only by important improvements in the art, but also by a decided rise of the profession in the social scale. As in the sixteenth century surgery found its basis in the new anatomy, so now it allied itself with the comparatively modern study of pathology, with the result that the surgeon, ceasing at length to be a mere mechanic, became a man of science. French surgeons, as befitted the countrymen of Paré and Franco, took a prominent part in the advance, but the place formerly occupied by Italy was now taken by our own country, though the work was carried on in different ways strikingly characteristic of the genius of the two nations. In France it centred in a State institution, the famous Royal Academy of Surgery, while in Britain it was made up of the scattered labours of private individuals, the most famous of whom, the immortal John

Hunter, may be said to have comprised an academy in himself.

The most representative French surgeons were, in the first half of the century, Anel and Petit, and in the second half Desault and Chopart. Anel, who joined the army in early youth and attained the rank of surgeon-major, gives us an interesting sketch of military medicine during the wars of Louis XIV. Educated surgeons were few, their place being supplied by "wound suckers," "some of whom are, or have been, soldiers, while others have never served, and are entirely ignorant of surgery. These all pretend to cure wounds by sucking them, after which they pour in a little oil, muttering certain charms, and then cover the whole with a compress shape like a St. Andrew's cross." The charms, says Anel, are nonsense; the oil does neither harm nor good; the sucking, however, is sometimes of great use in removing blood clots, and foreign bodies which prevent direct union. But it is disgusting and dangerous to do this with the mouth, and Anel therefore invented an ingenious suction syringe, which formed the germ of the complicated modern aspirators. His next achievement was the well-known operation for curing aneurism by ligature of the artery immediately above the sac, which he successfully performed on a monk at Rome, 30th January, 1710. Three years later he passed the first probe through the lachrymal duct of a living being, and invented a minute syringe to inject fluids into the sac, by which means he was able to cure cases of lachrymal abscess or mucocele without the use of knife or cautery.

J. L. Petit (1674-1750), like Anel, began as an army surgeon, and his experiences in that capacity doubtless aided him in the invention of the famous screw tourniquet, which preserves his name. He also improved the circular method of amputation by dividing the soft parts in two incisions instead of one, and he pointed out the great importance of removing all suspicious glands in the operation for cancer. Finally, he became director of the Academy of

Surgery, which was founded in 1731 for the purpose of putting an end to the continual quarrels between the barbers, master surgeons, and physicians, and which, on its dissolution in 1792, had fairly earned the praise of being the most useful of all academies. Its *Memoirs* contain the best results of the continental surgery of the age; it offered annual prizes for the investigation of disputed questions, and monarchs, such as Frederick the Great, sought its recommendation in appointing surgeons for themselves and their armies.

One of its greatest members was Pierre Desault (1744-95), whose name is still connected with a bandage for fractured collar-bone, but who did better service by the introduction of the gum-elastic catheter, the straight amputating knife, and the modern form of wire snare or *écraseur*, but above all, by the development of clinical instruction in surgery, in which he was aided by his friend Francis Chopart (1743-95), a practitioner known to every student from his operation on the foot.

The grand procession of British surgeons of the eighteenth century, is opened by William Cheselden (1688-1752), of St. Thomas's, who was the first to manufacture an artificial pupil by making a slit in the iris (iridentomy), and discovered, independently of Petit, the method of circular amputation "by two incisions". But he owes his fame chiefly to his improvements in lithotomy, an operation which he rescued from the hands of the specialists, and brought to such perfection that he is said to have gone through the whole process in fifty-four seconds, at the same time reducing the mortality to 7 per cent., a marvellous achievement in that age. Had he survived another year, he might have broken his record, for in 1753 Cæsar Hawkins, of St. George's, invented the cutting gorget, a terrific implement now abandoned, but much valued at the time, since it enabled the surgeon to operate with greater rapidity, and with less danger of wounding the rectum or pudic artery. The instrument was adopted and improved by the great

Desault, who made it the subject of his inaugural thesis at the academy.

To attempt to criticise the work of John Hunter (1728-93) in a paragraph, would be equally absurd and presumptuous, and the reader must refer to the masterly descriptions given by the leaders of our profession in their annual orations. We need only notice here (1) the extent and variety of his researches, which give him a place in the history of British surgery analogous to the one held by the academy in that of our neighbours; (2) the zeal with which he sought for principles without neglecting facts, thereby elevating surgery to the rank of a science, and accomplishing for that division of the healing art what the united labours of such men as Morgagni, Bichat and Laennec afterwards did for medicine; and (3) his two chief special services to the art, the improvement of Anel's operation for aneurism, and his study of the nature of inflammation.

Percival Pott, of St. Bart.'s, and Benjamin Bell, of Edinburgh, though alike in the alliteration of their names, differed widely in their mode of work, for while the former devoted himself to the study of a few special diseases on which he published monographs, the latter embraced the whole compass of the art and his *System of Surgery* remained a recognised text-book far into the present century. But while the name of Pott will probably last as long as the swelling, the disease, and the fracture with which it is connected, the work of Bell is utterly forgotten or confounded with those of his later namesakes, John and Charles.

As already noticed, it is characteristic of English surgery that it is not connected with any definite centre, and some of the greatest improvements in the art were made by provincial practitioners. Thus, in 1678 Lowdham of Exeter had revived the method of amputating by flaps, practised by the Greek surgeons of the first century; and about a hundred years later another important operation, that of excising diseased bones and joints, was restored almost simultaneously

by White of Manchester and Park of Liverpool, who may therefore be styled the fathers of conservative surgery.

The number of celebrated French and British surgeons of the last century is so great that many can only be named here, as, for example, La Peyronie, Louis, Le Dran, Goulard, Sharp of Guy's, the two Monros of Edinburgh, and Douglas, memorable for his researches on pelvic anatomy. Those of other nations may be briefly dismissed. Lawrence Heister was the Benjamin Bell of Germany; his *Institutes of Surgery* were translated into nearly all European languages, and almost equalled in fame the medical *Institutes* of his master Boerhaave. In Italy, Antony Scarpa advanced the science of surgical anatomy, and together with Cotugno made important investigations of the structure of the internal ear. Finally Spain, after a long interval, produced in Antony Gimbernat a surgeon and anatomist who might be mentioned in the same breath with her great men of old, Servetus and Arnald of Villanova.

NOTE.

Anel, *Nouvelle Méthode de guérir les fistules Lachrymales*, Turin, 1774; Desault, *Œuvres Chirurgicales*, Paris, 1830. For Cheselden see his biography in the *Asclepiad*, 1886. There is an account of Scarpa in the same volume. Wernher, *Die Académie Royale de Chirurgie*, Rohlfs' *Achiv*, 1878. It was dissolved on 18th August, 1792, on the motion of the ex-priest Grégoire, the same man who told Lavoisier that the Republic had no need either of men of science or of chemists ("La République n'a besoin ni de savants ni de chimistes").

LXI.—THE BRUNONIAN SYSTEM.

EVERYONE, it has been said, is born a disciple of Plato or of Aristotle, with a deductive or an inductive mental tendency. The former class is impatient of details, eager to establish general principles, given rather to reflection than

to observation, and prefers philosophy to the physical sciences. The inductive mind, on the contrary, relies less on intuition than upon the study of nature, devotes itself to the investigation of facts before attempting to explain them, and prefers to suspend its judgment rather than risk a hasty generalisation. These two tendencies, the scientific and the systematic, may be traced through the history of medicine, and stand out in striking contrast at the close of last century. On the one side pathologists and clinicians were establishing the basis for that progressive investigation which has revolutionised the healing art, while on the other, attempts were made to give immediate explanations of life and disease, and to lay down universal laws of treatment in the ingenious "systems" of Brown and Hahnemann.

Life, according to Brown, is a forced state produced by the action of stimuli on the "excitability" of the body. The stimuli are external and internal, warmth, food, the fluids of the body, muscular motion, the senses, passions, etc. Excitability is a mysterious something possessed by all living beings, which is continually being used up and renewed during life, and which varies inversely with the stimulus. To take an illustration given by one of his pupils. Suppose a furnace continually supplied with coal which will only burn so long as it is blown. Then the fire will represent life, the coal excitability, and the bellows the stimulus. The fire may be put out in two ways, by ceasing to blow, or by blowing so hard that the coal is consumed more rapidly than it is supplied. Similarly death occurs, either when the stimulus sinks below a certain level, or when it is so violent as to exhaust the excitability; and, on the other hand, life is most stable and vigorous when both stimulus and excitability are of medium amount.

Brown's pathology is exactly parallel with his physiology. Diseases are due either to excessive or deficient excitement (*i.e.*, life), and are termed sthenic or asthenic, according as they arise from the former or latter cause. Asthenic diseases are far the most common, forming 97 per cent. of the

whole, and they may be produced either by deficient stimulus (direct debility), or deficient excitability, following excessive stimulus (indirect debility). This may be made clearer by an illustration given by Brown himself, and, according to his biographers, frequently exemplified by him. A man slightly below par, or with a tendency to direct debility, drinks five glasses of wine. This, by taking off the excess of excitability, and adding to the stimulus, brings him to the normal state of health. He then drinks five more glasses, and his original state is now reversed, the stimulus being in excess and the excitability deficient. But, says the jovial Brown, we are not so flimsily made as not to stand a little excess, and the man is still in perfect health, though with a tendency to sthenic disease, which is increased on his taking five further glasses. Finally, should he drink twenty (!) glasses of wine the excitability becomes exhausted, the excitement sinks with it, and the man falls into a comatose state from indirect debility. He remains thus for some hours, and, the stimulus being reduced to its lowest point, excitability rapidly reaccumulates, so that on awaking he finds himself in the opposite condition of direct debility, with headache, shaky hands, etc., symptoms which may be readily removed by taking a slight stimulant to get rid of the excess of excitability. It follows from this pathology that diseases differ from one another and from the state of health, not in nature, but only in degree, and Brown declares that "the huge volumes on diagnosis" of the "old school" are now unnecessary, for when a physician is called to a case he has merely to decide three questions: Is the disease general or local? Is it sthenic or asthenic? What is its degree?

If the above theory be true, the rule of treatment is as simple as it is obvious—we must restore the normal degree of excitement by regulating the stimulus. According to Brown, all modes of medical treatment are forms of stimulus, differing only in degree, and he arranges the chief of them in the following order of relative efficacy: Opium, camphor,

ammonia, musk, alcohol, active exercise, stimulant food, warmth, passive exercise, low diet, cold, purgatives, bleeding. The last five of these may conveniently be termed debilitants, since the excitement they produce is below the normal, and it is by them that the comparatively rare sthenic diseases, including small-pox, measles and pneumonia must be treated. Thus when Brown's son, aged six, had measles, he stript him half naked, reduced his diet to "fluid vegetable matter," and let him run about as he pleased, whereupon he rapidly recovered. Opium is the greatest of stimulants, and is the sheet-anchor in treating all diseases of debility direct or indirect. In the former the excessive excitability should be removed by small doses gradually increased, while cases of indirect debility must be met by a stimulus slightly less than that which has produced the exhaustion. To use Brown's own words: "In direct debility, where the redundancy of excitability does not for a time admit of much stimulus, ten or twelve drops of laudanum should be given every quarter of an hour, till the patient sleeps. After sleep, when some of the excessive excitability is worn off, a double quantity should be added, and gradually increased till the healthy state is regained. In indirect debility 150 drops (!) should be forthwith thrown in, and the superadditions made less and less." Local diseases are comparatively rare; they are characterised by the absence of any premonitory stage, which is always present in general affections, and they are to be treated on the same principles.

Such are the essential points of what is probably the simplest, most original, and most philosophic system of medicine ever invented. Compared with it the ancient methodism and the later homœopathy are little more than rules of treatment; and if it be the object of medicine to discover a philosophic theory on which may be based a simple and universal law of practice, then John Brown must be placed above Hippocrates. His definition of life shows striking resemblances to the views now accepted, and was compared at the time with the doctrine of John Locke; for

just as that great medical philosopher declared that the mind contains no ideas in itself, but merely the power of receiving and developing them, so Brown held that the body has no innate life, but only a capacity for developing it from the action of stimuli. So, too, his theory that diseases are abnormal vital processes agrees with that now adopted, and which had already been advanced by Boerhaave in his famous definition: "Morbus est vita praeter naturam". Brown further did good service by accentuating the reactive power of the body, by opposing excessive depletion, and by showing that inflammation might be a sign rather of deficient than of excessive vital action. Finally, his assertion that life and death, sickness and health, the causation and cure of disease, the decay and renewal of nature, are all different manifestations of one and the same activity, shows that, like Paracelsus, with whom he is frequently compared, Brown was by no means destitute of genius.

But being based upon reflection rather than observation, Brunonianism failed in practice, and it has been considered here chiefly because it shows in a most striking way the defects of the systematic method. To say with some historians that the new doctrine cost as many lives as did the wars of Napoleon would indeed be an exaggeration, but the examples of treatment given above show that to accomplish this feat it only required to be sufficiently widely accepted. Happily it was not widely accepted. All systems of medicine tend to close the way to further progress, the more so the greater their completeness and finality; and Brown's system was especially antagonistic to the forms of medical progress then inaugurated, the local pathology of Morgagni, and the local diagnosis of Auenbrugger and Laennec. Moreover, those physicians who must have a "system" at any cost, were offered an attractive alternative in the doctrine of Hahnemann, which, though inferior in philosophic completeness and originality to that of Brown possessed an immense advantage in the safety with which it might be applied in practice.

NOTE.

Brown, *Elements of Medicine* (with *Life* by Beddoes), London, 1795. See also *Asclepiad*, 1887, and Gairdner, *The Physician as Naturalist*, 1889. For the modification which the system underwent in Italy and Germany consult Weikard, *Geschichte der Brownischen Lehre*, Frankfort, 1796; Hirschel, *Geschichte der Brownischen Systems*, Leipzig, 1850.

LXII.—THE ORIGIN OF MODERN MEDICINE.

WHEN Lancisi found the anatomical drawings of Eustachius, which had been hidden away at Rome for 150 years, he sent them to a young friend of his, then professor of theoretic medicine at Padua, requesting him to point out what discoveries they contained which had been rediscovered during that interval. The answer, which was returned within eight days, was published with the plates in 1714, and so increased its author's reputation, already established by certain *Adversaria Anatomica*, that he received what might be called the blue ribbon of the medical professorate, the chair of anatomy at Padua, illustrious through the labours of Vesalius, Columbus, Fallopius, Fabricius, Gasserius, and Spigelius. It was now destined to receive a further accession of renown, for the name of the new professor was John Baptist Morgagni (1682-1771).

The great Eustachius regretted in his old age that he had not devoted himself to "that more obscure side of anatomy, that field so little cultivated, yet so fertile in discoveries important to the healing art," the study of morbid structures, and this possibly determined the direction of Morgagni's work, resulting after forty-six years in the production of his famous *Seats and Causes of Disease, Investigated by Anatomy* (1761), one of the great books of medicine, which gained for its author the title of "Father of Pathology". Not that Morgagni was the first pathologist, any more than Hippocrates was the first physician, but he combined in

himself all the knowledge of his predecessors in that department, while avoiding their errors. Thus his perfect acquaintance with ordinary anatomy prevented him from mistaking normal for abnormal structures, or *vice versa*, as the older pathologists had often done. His predecessors had usually confined themselves to noticing extraordinary cases; but Morgagni, like Haller, held that the commonest diseases are the most important, and demand the most careful investigation. Above all, he was not content to notice the morbid changes only, but sought in every case to connect them with the history of the patient's disorder, thus avoiding the error—not entirely unknown among his successors—of confounding pathology with morbid anatomy, and diseases with organic lesions. He never even uses the term "pathological anatomy," so common since his day, for to him anatomy was the means, not the end, of his work, which was to investigate the nature of disease. His eagerness to trace the connection between function and structure naturally led him to vivisections, and we find him opening the body of a living animal, "more majorum," as he calls it, to find out whether the pericardium is closely applied to the heart during life. To attempt to give an idea of Morgagni's great work by a few quotations would be like sampling a house by a basket of bricks, and it must suffice here to say that since the publication of the *Seats and Causes*, the foremost question with a physician when examining a patient has been—Where is the disease?

By a curious coincidence, there appeared in the same year as Morgagni's two large folios a small pamphlet by Joseph Leopold Auenbrugger, a junior physician at the Vienna Hospital, which was destined to give important aid in answering the above question. This work, entitled, *A New Invention for Discovering Obscure Thoracic Diseases by Percussion of the Chest*, contained the results of six years' experience, and gave a wonderfully complete account of the sounds got by percussing various parts of the chest in health and disease, their value in diagnosis and prognosis, and the

diseases which can and which cannot be so distinguished. Even the fremitus and relative mobility of the chest wall are not unnoticed, and one is astonished that Auenbrugger should have failed to complete his work by the discovery of auscultation. His clinical results were confirmed by *post mortem* examinations, and contemporary writers admit that the method enabled him to treat cases of pleurisy and empyema with remarkable success; yet the importance of the "new invention" was recognised only by a minority till, in 1808, Napoleon's physician, Corvisart, published a French translation, with a commentary and preface which did equal honour to himself and the author. Since then, the prayer with which Auenbrugger concludes his work has been abundantly answered: "Cedant haec miseris ægris in solatium, veris autem medicinæ cultoribus in incrementum artis. Quod opto."

The discovery became doubly valuable on the publication of the treatise, *On Mediate Auscultation*, by R. T. H. Laennec, in 1819, about four years after he had invented the stethoscope. Direct auscultation was, as we have seen, not unknown to Hippocrates, and had been practised to some slight extent by his successors; but Laennec may claim the honour of discovering a more convenient method, of introducing it into general use, and of establishing its great importance in practice. We need scarcely, however, dilate upon this, for has not the stethoscope become a sort of crest or badge of the modern physician?

Less striking, but no less valuable in its results, was the work of M. F. X. Bichat, the shortest lived but one of the greatest of the heroes of medicine. Only one side of this work can be noticed here, his foundation of a new science now called histology, but then known as general anatomy. Bichat decomposed the organs of the body into their constituent elements, showing that they are made up of tissues, each possessing definite physical and vital properties; and he declared, as Boerhaave and Haller had done before him, that it is the physician's business not to speculate about

abstract principles, but to trace the connection between the phenomena of life and the properties of the tissues in which they are manifested. He further pointed out that pathological phenomena are due to an alteration in these properties, and that the object of therapeutics is to restore, as far as possible, the natural type. To use his own language: "Le rapport des propriétés comme causes avec les phenomènes comme effets est un axiome presque fastidieux à répéter aujourd'hui en physique, en chemie et en astronomie. Si mon ouvrage établit un axiome analogue dans les sciences physiologiques il aura rempli son but." He died in his thirty-first year, 22nd July, 1802, from a malady acquired in the dissecting room. The next day Corvisart wrote to Napoleon: "Bichat has just fallen on a battlefield which numbers more than one victim. No one has done so much and so well in so short a time."

The three processes here briefly sketched, local pathology, local diagnosis, and the study of the tissues, form, as it were, the three legs of the tripod upon which the genius of modern medicine took her seat. There she received inspiration from many and varied sources; so many and so varied, indeed, that they cannot be adequately discussed within the limits of this short outline. We have followed the healing art in its long wanderings of something like forty centuries, and brought it at last to the borders of a land of promise. The occupation of this scientific Canaan may be said to have begun with the present century, and a magnificent specimen of its products had already been obtained in the great discovery of vaccination, the first fruits, we may fairly hope, of a vintage to be gathered in our own generation. But modern medicine differs so widely from that which preceded it, both in principles and complexity, that their point of junction forms a convenient termination for the present history, a main object of which has been to show that there were heroes before Agamemnon, and great physicians before the invention of the stethoscope. The writer has also attempted to point out the close connection which exists between the history

of medicine and that of general civilisation. The healing art is not, as some seem to think, the product of a special class, upon whose mistakes and failures the rest of mankind may look down with amusement or contempt; but is rather the final outcome of the efforts of the human race in all ages, to solve the perpetual riddles of a sphinx who punishes every error without passion, but without pity. And if wild guesses at a solution have sometimes been made, it has usually been with the not ignoble object of seizing upon some general principle or panacea, which might forestall the slow progress of science, and afford some immediate relief to the innumerable bodily ills of man. Nor have the wildest guesses been entirely worthless. In the long pilgrimage up the hill Difficulty, some have stumbled on the dark mountains of Error on the one side, and some have lost themselves in the great wood of Vague Speculation on the other; but on the whole there has been an almost continuous progress, a progress assisted not only by the labours of such men as Harvey and Bichat, but even by the ill-directed energies of a Paracelsus, a Brown or a Hahnemann.

NOTE.

Eustachius, *Tabulæ Anatomicæ*, Rome 1714. The quotation is from his *Opuscula Anatomica*, cap. 45. Morgagni, *De Sedibus et Causis Morborum per Anatomen Indagatis*. The best edition is that by Tissot (Ebroduni, 1779), which contains a very complete biography. There is an English translation by Alexander (Edinburgh, 1769). Falk, *Die Pathologische Anatomie und Physiologie des I. B. Morgagni*, Berlin, 1887. Clar, *L. Auenbrugger, und sein Inventum Novum*, Graz, 1867 (a reprint of the pamphlet with biography, etc.). Laennec, *Traité de l'Auscultation Médiate*, Paris, 1879. Bichat's chief works are *Traité des Membranes*, *Recherches Physiologiques sur la Vie et la Mort*, and the *Anatomie Générale*, which are published in many separate editions and together in his *Oeuvres*, Paris, 1852. His biography may be found in the ordinary works of reference, and in *The Hundred Greatest Men of History*, London, 1885.

APPENDICES.

Eustachius. "...
...
...

APPENDICES.

APPENDIX I.

THE MEDICINE OF CHINA AND JAPAN.

THE history of Western medicine since the time of Hippocrates is the record of a fairly continuous effort to obtain some exact knowledge of the nature of disease and the best mode of treating it, or, in other words, to establish a science of medicine upon anatomy and physiology. In this sense the two great Eastern nations have no medical history, for they made no such attempt worth mentioning; but an account of their chief medical books, of the theories which took the place of anatomy and physiology, and of their more typical modes of treatment, may be not without interest.

The Chinese attribute the origin of medicine to a mythical emperor Ching-Nong, who was also the inventor of agriculture and the father of his people, for he allowed no drug to be used till he had tested it upon his own imperial person. His wisdom equalled his benevolence, and such were the virtues of the food and remedies he introduced, that his life and those of his contemporaries were prolonged beyond the normal span. His successor Hwang-ti (2697-2598) also lived to a great age and laid down a regular system of medicine in the *Nuei-king*. This work was exempted from destruction by the author's namesake Chi-Hwang-ti, "the burner of books," B.C. 213, and has survived to our own day, though it may be doubted whether any of its present contents is more ancient than the Christian era.

In the second century appeared the *Nang-king*, and in the third Wang-Shu wrote ten large volumes on the pulse. In 629 schools of medicine and astrology were established in all the chief towns, each consisting of a director and two professors; but they seem to have done nothing for the progress of the art, and no more medical books of importance were published till 1247, when Sung-Tse wrote his classical work on forensic medicine, the *Si-Yuen-Luh*, which indicates the high-water mark of Chinese

LANE MEDICAL LIBRARY
STANFORD UNIVERSITY
MEDICAL CENTER
STANFORD, CALIF. 94305

medical science. It is said to contain valuable observations on the symptoms of drowning, and the fame of its mysterious wisdom is so great, that the very sight of it is enough to make poisoners, etc., confess their crimes. About 1500 appeared the chief Chinese cyclopædia of medicine, edited by Prince Chu-Su of the Ming dynasty, and comprising 160 volumes, 770 treatises and 22,000 prescriptions. It was mainly from this that a committee of 800 physicians under the presidency of Li-Shi-Chin compiled in 1596 the famous *Pun-Tsaou-Kang-mu*, or Chinese materia medica, in fifty-two volumes, describing 1890 drugs. Medical literature then degenerated for a time into shorter monographs, of which only that on acupuncture (seven volumes with copious illustrations) need be noticed here. In 1740 appeared a work of ninety volumes on the pulse, with a short notice of the circulation of air in the body and the treatment of fractures; and about the same time the *Pentsao*, or chief Chinese work on botany was published.

Beyond the knowledge of the proper places for acupuncture the Chinese have no anatomy worthy of the name, for the diagrams of the inside of the body now in use seem to be derived largely from Western sources, and show the dangers of a little knowledge. Thus the windpipe is made to pass directly into the heart, from which three other tubes arise connecting it with the liver, spleen and right kidney, from which last a canal passes to the brain.

In the Chinese classical works, anatomy, physiology, pathology and therapeutics are all mingled together, and combined with fanciful analogies reminding us of those of Paracelsus and the mediæval practitioners. Thus there are five chief organs, each corresponding to one of the five elements, planets, seasons, etc., as is briefly indicated in the following table:—

Organs.	Elements.	Planets.	Seasons.
Heart.	Fire.	Mars.	Summer.
Lungs.	Metal.	Venus.	Autumn.
Kidneys.	Water.	Mercury.	Winter.
Liver.	Wood.	Jupiter.	Spring.
Stomach (& spleen).	Earth.	Saturn.	End of each season.

Colours.	Tastes.	Time of Day.	Points of Compass.
Red.	Bitter.	Noon.	South.
White.	Sharp.	Evening.	West.
Black.	Salt.	Night.	North.
Blue.	Acid.	Morning.	East.
Yellow.	Sweet.	Twilight.	Zenith.

There are also five external organs which act as signals or indicators: thus the tongue shows the state of the heart, the nostrils that of the lungs, while the mouth, ears, and eyes do the same for the stomach, kidneys and liver respectively. A black tongue and swollen palm of the hand are signs of destruction of the heart, which will be followed by death in one or two days.

Sharp, white, metallic remedies are good for the lungs as shown in the above table, but metals are also good for the liver, since metal dominates wood, which corresponds to that organ.

Each of the five organs has a canal of communication (king) carrying vital heat and radical moisture throughout the body. The direction of these canals is entirely imaginary, thus the sin-king, or canal of the heart, goes from that organ to the end of the little finger, sending branches to the small intestine and the eyes, where they meet other canals. The blood, air and vital spirits in these canals go through a sort of "circulation" fifty times in the twenty-four hours; they travel six inches in every respiration and there are 13,500 respirations *per diem*, whence the reader may calculate the extreme length of the canals.

The chief cause of disease is the imperfect mixture of the air and fluids, which hinders the proper motion of the latter, and it manifests itself especially though changes in the pulse, or rather pulses, for they are many. The body resembles a musical instrument, the pulses are its chords, and the study of their varieties is the first duty of the Chinese physician. He must know the places where they can be felt, especially the three pulses of each arm, tsuen, tche, and kouan, and their relations to the different organs. He must be acquainted with the natural pulses of the various organs and the changes they undergo according to the seasons, years and months. He must be fully conversant with the seven internal and eight external pulses, the nine pulses of the canals of communication, the superficial pulse of the skin and flesh, the middle pulse of the nerves and blood, and the deep pulse of the bones. Above all he should be able to distinguish at once any of the twenty-six pulses which portend death, as for example the Tu-tsiang pulse, which resembles a fish caught by the head who waggles his tail quickly and irregularly. After this we are not surprised to hear that a conscientious Chinese practitioner frequently takes more than an hour feeling his patient's pulses.

Next in importance to the pulse is coughing (seou), which is supposed to be connected with irregular movements of air in the canals. There are sixteen kinds of cough: air cough (ky-seou), cold cough (han-seou), wet cough (sie-seou), hot cough (je-seou), night cough (ye-seou), intermittent cough (che-seou) and others due to fatigue, disappointment, bad temper (very common in women), indigestion, dryness, bile, blood, intoxicants, roughness and fever. The physician should be able to distinguish each of these, for each has its specific remedy; but should he fail to do so, there are some things, *e.g.*, a mixture of ginger and honey, which are good for all.

The Chinese materia medica, as noticed above, is very extensive and includes fossil bones (dragons' teeth), human flesh, and other substances resembling those used by our own ancestors. Their most famous drug is the well-known gin-seng, the root of a species of Panax, which is sold for many times its weight in gold, and probably owes its imaginary virtues to its resemblance to the human body. But the Chinese were also probably the first to use rhubarb, ginger, and mercury, in the form of cinnabar, internally, attracted no doubt by its bright red colour. Here are some useful prescriptions. To prevent thirst on a journey: Take of sugar 4 oz., fou-ling (pachyma-cocos) 3 oz., po-ho (peppermint) 4 oz., liquorice 1 oz., make into pills with honey, and hold one in the mouth. To remove ink stains (? Chinese ink only) take seeds of apricot (hing-jin) and white lily (pe-ho), powder them together, mix with water and rub in. A more celebrated remedy is menthol (po-ho-yo), which is frequently effectual in cases of neuralgia, and has spread throughout the civilised world.

Another Chinese discovery which was widely adopted by Western nations is inoculation for small-pox, which disease is said to have existed in China since 1122 B.C.

Celestial historians are nothing if not correct in their dates, but we may venture to doubt whether the Chinese could have kept so rapidly spreading a disease to themselves for fifteen centuries. According to native authorities the disorder was originally so mild that it was hardly considered a disease; but the overthrow of the old empire and the introduction of new manners and bad habits made it more deadly and universal. This latter quality gave rise to the idea of inoculating the

disease when the patient was in the best state to resist its effects, and the operation was first performed with brilliant success on the grandson of the Emperor Tchin-siang, at the end of the tenth century, and spread rapidly throughout the empire. But it did not fulfil the hopes entertained, and in 1767 an epidemic is said to have destroyed 100,000 children at Pekin in a few days.

The typical forms of Chinese medical treatment are acupuncture (tchin-kieow) and the moxa. The object of acupuncture is to let the air mix more perfectly with the fluids and so favour their circulation. The physician must know the 388 points of election, the depth of puncture permissible in each case, and the time during which the needles may be left in. When the pulse is strong the needle must be pointed to the left, when weak to the right, when there is pain it should be vertical; in the first case it is rotated from left to right, in the second from right to left. The patient is instructed to cough during the operation, and it is very important not to omit giving the needle three final taps with the nail of the middle finger.

The effect of acupuncture is increased by the use of the moxa. A cylinder formed of the dried leaves of artemisia vulgaris is placed on the appropriate spot, and set on fire, acting as a mild cautery, which may be repeated if necessary.

The above are the doctrines of average Chinese practitioners, who are usually persons who have failed in the examinations for public offices. Besides these there are two other classes, the general populace, who have great faith in the power of demons, charms and amulets, with which, however, we need not trouble ourselves, and the philosophers, who adhere to the great yang-yn theory. The yang-yn (or yo-in) theory is simply the "polarity" of Reil and our "modern Zoroastrians," under a new name. Yang is positive, and represents the male principle, activity, vital force, air, etc., and tends to rise; yn is negative, corresponding to the passive or female principle, softness, moisture, etc., and tends to sink. Every bodily organ has a definite proportion of yang and yn; organs in the upper part of the body have most yang, while in lower yn predominates. So long as the normal proportion is maintained there is health; but if either principle is in excess disease is produced; too much yang causes acute and inflammatory disorders; chronic and asthenic diseases are due to

a superabundance of yn. The proper treatment is to administer substances containing a large proportion of the opposite principle. Strong and savage beasts such as the horse and tiger and the upper parts of plants abound in yang; mild and feeble animals as the sheep and silkworm and roots of herbs have much yn in them. Most readers will consider this "the higher nonsense," to use a German expression, but it exactly corresponds to the doctrines taught by philosophic physicians in the early part of the present century.

Surgery, though now practically unknown in China, seems to have flourished at an earlier period; for Hwa-tho, who lived under the Wei dynasty (A.D. 230), is said to have given his patients a preparation of ma-yo (hemp) "on which they became insensible as though dead drunk or dead. Then, as the case required, he performed operations, incisions or amputations, removing the cause of the malady, and afterwards brought together the tissues and applied liniments. The patients recovered after some days, without having felt the slighest pain during the operation."

The great motto of Japanese physicians, before the revolution of 1867, was "The old is better," which conservative principle was but slightly modified by a second aphorism, "They know more about these matters in China". They traced the origin of their art to a mythical Shinon, in whom it is not difficult to recognise the Chinese emperor, Ching-nong, and their oldest medical classic, the *Shookamon*, was translated from the Chinese by Tchookuke, about the year 350. Most later works are commentaries upon this, and, as it deals with fevers only, the more conservative practitioners held that all diseases are of a febrile character. Some bolder spirits, however, rejected this doctrine, and so another book was written, the *Kinki* (gold casket), on non-febrile disorders. Besides these we may mention the *Somon*, a sort of medical catechism, in the form of question and answer, and the *Hondso*, or materia medica, which appeared in the seventeenth century, and is the most modern work that a genuine Japanese physician thinks it safe to consult.

The *Hondso* is even larger than the *Pun-Tsaou*, for the Japanese drugs are still more numerous than those of China. They include, as a matter of course, everything rare or extraor-

dinary, as well as nearly all other known substances in immense variety. Thus, to take minerals only, there are twenty-seven metals, twelve gems, eighty-two other stones, twenty-one saline stones, sixty kinds of earth, and forty varieties of water, besides mineral waters. Each kind of water is good for some special disease, and the varieties include rain-water, pond, river, well, dew, pool, hail, snow, and ice-water, water soaked through old roofs, water from graves (useful in insanity and eye affections), water in which snakes have lived (good for internal ulcers), water from pig-styes (used externally for snake bites, against which pigs are said to be proof, and internally for worms, which seems decidedly homœopathic), etc., etc.

But Japanese medicine, though closely resembling that of China, is not without native modifications. Its physiological theories deal not so much with the movement of air and fluids in the body, as with the "spirits" of the various organs, and the pulse is supposed to be due to the knocking of these spirits, who in this way make themselves intelligible to the wise physician. The three wrist pulses, for instance, zun, shaku, and kuan, are caused by the spirits of the liver, heart, and spleen respectively. The object of acupuncture is to rouse the energy of the spirits, and that of the moxa to give them strength, the flame being looked upon as a sort of vital spirit which enters into the body.

There is strong evidence that the moxa was a Japanese rather than a Chinese invention. It is employed much more extensively in Japan than in China; it is used by common people and old women even more than by the regular physicians, and its object is an entirely different one, *viz.*, to prevent, not to cure, disease.

But the most typical Japanese forms of medical treatment are massage and the hot bath. The former is practised by a special class of blind masseurs "Ammasan," formerly very numerous in Japan owing to the ravages of small-pox; it is carried out according to a definite and complicated set of rules, and is employed in all kinds of internal diseases, especially rheumatism, neurasthenia, headache and fatigue. Massage is commonly preceded by baths at a very high temperature, for the Japanese strongly disapprove of cold or lukewarm bathing, which they consider unhealthy.

In the department of obstetrics they are decidedly in advance of their Chinese teachers; but for an account of this, and of the social status of physicians in Japan, the reader should refer to Wernich's *Zur Geschichte der Medicin in Japan*, Rohlfs' *Archiv*, 1878, and Gierke, *Ueber die Medicin in Japan in alten und neuen Zeiten*, the same, 1884, to both of which I am indebted.

For Chinese medicine see the articles on the subject in the *China Review*, 1872, and *Chinese Recorder*, vol. ii. Dabry, *La Médecin chez les Chinois*, Paris, 1863. Soubeiran, *La Matière Medicale Chez les Chinois*, 1874. Wernich, *Chinesische Medicin*, in Hirsch's *Biographisches Lexikon Hervorragender Aerzte*, Vienna, 1884.

Dr. Heerajee, in his interesting *History of the Medical Art* (Bombay, 1880), gives the following Chinese cure for nightmare: "Do not bring in a light, or call loudly to the sleeper, but bite his heel or big toe, and gently utter his name; also spit in his face, and give him some ginger-beer; he will soon come round. If not, blow into his ears through small tubes, pull out fourteen hairs from his head, twist them together and poke them up his nose."

APPENDIX II.

THE ASCLEPIADÆ AND THE PRIESTS OF ÆSCULAPIUS.

WHEN Pausanias, the tourist, visited the temple of Æsculapius at Epidaurus (about A.D. 150), he noticed six pillars engraved with stories of patients, two of which have been recently discovered in the excavations carried out there by M. Cavvadias. They date from about the close of the fourth century B.C., and the following is a translation of the parts which have been preserved.

One of the pillars, probably the first of the series, has a special heading: "God. Good fortune. Cures of Apollo and Asclepios." Then follow twenty cases, nineteen of which are given here:—

(1) Cleo, pregnant five years. She being already five years pregnant came a suppliant to the god, and lay down to sleep in the sacred chamber (ἀβάτῳ); but she went out speedily, and got forth from the temple and bore a son, who immediately washed

himself in the spring and walked about with his mother. Now, when this had happened to her, she wrote on a votive tablet:—

"Marvel not at the size of this tablet but at the occurrence:
Five years Cleo was pregnant, she slept, and the god made her whole".

(2) A three years' girl. Ithmonica of Pellas came to pray for offspring, and, having lain down to sleep, saw a vision. She seemed to ask the god that she might conceive a girl, and Asclepios said she should, and that he would fulfil whatever else she asked, but she said she needed nothing more. Then she became pregnant and remained so three years. Then she resolved to supplicate the god for the birth, and having slept she saw a vision; the god seemed to ask whether all she required had not happened to her, since she had conceived, for she had asked him nothing about the birth, and that though he had further inquired if she needed ought else; but, now she had at length come a suppliant for this, he would also accomplish it. Then she hastily left the chamber, and having got out of the temple was delivered of a girl.

(3) A man with the fingers of his hand paralysed, save one. He came a suppliant to the god, and seeing the tablets in the temple he disbelieved the cures, and ridiculed the inscriptions, and sleeping he saw a vision. He seemed to be playing dice, and, as he was about to throw, the god appeared, seized his hand, and stretched out the fingers, then he seemed to bend them up and stretch them out one by one, and when all were straight the god asked if he still disbelieved the inscriptions on the tablets, and he said no. Then he said: "Fear not for thy former unbelief, but, that thou mayest believe in future, thou shalt obtain what a believer obtains" (?) (the sentence is much mutilated). And when it was day he went away whole.

(4) Ambrosia of Athens, blind of one eye. She came a suppliant to the god, and going round the temple ridiculed some of the inscriptions, saying it was incredible and impossible that the lame and blind should be cured by seeing a dream-vision only. But having slept she saw a vision; the god seemed to stand by her and say that he would heal her, but would demand as payment a silver pig to be set up in the temple as a memorial of her stupidity. Having thus spoken, he opened her diseased

eye and poured medicine on it, and when it was day she departed cured.

(5) A dumb child came as suppliant to the temple on account of his speech, and when he had sacrificed and done what was usual the attendant who served the altar, looking at the boy's father, said: "Do you agree to make payment for the cure within a year, if that happens for which he has come". Then the child suddenly said: "I agree". The father, amazed, bade him say it again, and after this he was cured.

(6) Pandarus the Thessalian had (brand) marks on his forehead. He, when asleep, saw a vision. The god seemed to tie his head-band (ταινία) round the marks, and to bid him, when he left the chamber, take off the band and dedicate it in the temple. And when it was day he did so, and his forehead was clear; and he dedicated the band, which had the marks on it.

(7) Echedorus got Pandarus' marks as well as his own. Having received money from Pandarus to consecrate to the god he came to Epidaurus for the same reason, but kept the money. Lying down to sleep he saw a vision; the god seemed to ask him whether he had got money from Pandarus to make an offering; but he said no, he had nothing, and begged to be cured gratis and he would put up a tablet. Then the god bound the head-band of Pandarus round the marks, and told him when he went out to take it off, wash his face in the well, and look at himself in the water. When it was day he went out, took off the band, and the letters were no longer on it, but looking into the well he saw his face with his own marks and those of Pandarus also.

(8) Euphanes, an Epidaurian boy. This patient incubated because of stone. The god seemed to stand and ask: "What will you give if I cure you?" and he said ten dice bones. The god laughed and said he would heal him, and when it was day he departed cured.

(9) A man once came who was so blind that one of his eyes had only the lids left, and seemed an empty space. Some persons in the temple ridiculed his simplicity, to hope for recovery when he had only an eye socket and no eye. He slept and had a vision; it seemed that the god prepared a medicine,

separated his eyelids and poured it in. At daybreak he departed, seeing with both eyes.

(10) The cup. A porter on his way to the temple fell when ten furlongs from it. He rose and opening his sack found the contents were broken. Seeing that the cup his master drank from was smashed, he was in despair, and sitting on the ground tried to fit the pieces together. A passer-by seeing this exclaimed: "Why, miserable man, waste time in trying to mend that cup; not even Asclepios of Epidaurus could do it". The slave hearing this put the shards in his sack and went to the temple. On arrival he opened the sack and found the cup mended. He told the story to his master, who presented the cup to the god.

(11) Æschines climbed up a tree while the suppliants were sleeping and looked into the chamber; but he fell on some stakes and severely injured both eyes. Blind and in agony he besought the god, and went away cured.

(12) Evippus carried a spear-point in his jaw for six years. He slept, and the god having extracted the weapon placed it in his hands. At daybreak he departed cured, taking the weapon with him.

(13) A man of Torone who had swallowed leeches. Having slept he had a vision; the god appeared to open his chest with a knife and take out the leeches, which he placed in his hands and then closed his chest. At daybreak he went off with the leeches in his hands, and was cured from that hour. His illness was due to the perfidy of his step-mother, who put the leeches in a mixture of wine and honey which he drank.

(14) Hermodicus of Lampsacus, feeble in body, slept, and the god having cured him bade him go forth and carry into the court the largest stone he could find. He carried that which is now before the sleeping chamber.

(15) The lame Nicanor. As he sat wide awake a child stole his staff and ran; Nicanor rose and pursued him, and from that moment was cured.

(16) A man cured of a bad toe by the serpent. This man suffered much from an ulcer on his toe. The temple servants carried him out and set him on a seat. While he slept a serpent came from the sanctuary and cured his toe with his tongue, and

then returned. The patient awoke, and, finding himself cured, said he dreamt that a beautiful youth had appeared and applied a remedy.

(17) Alcetas of Halice. He was blind and had a vision; the god seemed to open his eyes with his fingers and he saw the trees in the temple court. Day broke and he departed cured.

(18) Heraus of Mytilene. This patient had no hair on his head, but much on his chin. Vexed by the ridicule of his neighbours, he incubated. The god anointed his head with a drug and made him have hair.

(19) Thyson of Hermione, a blind child. While he was wide awake one of the temple dogs licked his eyes and he departed cured.

Second Pillar—(1) Arete of Lacedæmon, dropsy. This patient stayed in Lacedæmon, and her mother incubated for her and saw a vision. The god seemed to cut off her daughter's head and to hang up the body neck downwards, and when much fluid had run out he replaced the head. Returning to Lacedæmon, she found that her daughter was well, having seen the same vision.

(2) Hermon the Thasian was blind, and was cured; but since he made no offering the god made him blind again. Then he came back, and incubated, and was healed.

(3) Aristagora of Troezen. This woman had a worm in her belly, and incubated in the precincts (τέμενος) of Asclepios at Troezen and saw a vision. The servants of the god (who was not there, but was staying at Epidaurus) seemed to cut off her head, but being unable to put it on again sent some one to fetch Asclepios. Meanwhile day came upon them, and the priest saw while wide awake the head separated from the body. The next night Aristagora saw a vision. The god appeared to her (having come from Epidaurus), replaced her head, and opening her belly took out the worm and sewed it up again, and thenceforth she was healed. (This story is told in nearly the same words by Hippys of Rhegium, a historian of the fifth century B.C., but he transposes Troezen and Epidaurus.)

(4) The child Aristocritus of Halicé in the rocks. He dived in the sea, and swam under water till he got to a dry place surrounded by rocks, where he could find no exit. His father, after

seeking him everywhere, incubated in the sacred chamber of Asclepios for his son, and had a dream. The god seemed to take him to a certain place and showed him his son there. So, leaving the chamber, and quarrying a passage through the rocks, he found his son on the seventh day.

(5) Sostrata pregnant (?) for a year. She came in a litter to the temple, but since she saw no clear vision she returned home. On the way a man of noble aspect met her and her attendants near Kornus; and, hearing from the latter of her evil plight, bade them set down the litter on which they carried Sostrata; then opening her belly he took out a vast multitude of —?— filling — ?— footpans, and sewing her up healed her. Then, bidding them send the offerings for the cure to Epidaurus, Asclepios disappeared.

(6) A dog cured a boy of angina. This patient had a swelling in his neck, and, having come to the god, one of the temple dogs healed him with his tongue while wide awake.

(7) A man with an ulcer in his stomach. He incubated and saw a vision; the god seemed to order his followers to seize and hold him, that he might incise his stomach; so he fled, but they caught and tied him to the door-knocker (?) (*πρὸς ῥοπτόν*). Then Asclepios opened his stomach, cut out the ulcer, sewed him up again, and loosed his bonds. He went away whole, but the floor of the chamber was covered with his blood.

(8) Cleonetas of Thebes, he with the lice. This man having a vast quantity of lice on him came and incubated and saw a vision. The god seemed to strip him, and setting him up naked cleaned the lice from his body with a broom. And when it was day he left the chamber healed.

(9) Agestratos, headache. This patient was sleepless from pain in the head; but when he was in the chamber he slept and dreamt a dream. The god seemed to cure his headache, and then set him up naked, and taught him a grip in the pancratium. At daybreak he departed cured, and soon after won the pancratium at Nemæa.

(10) Gorgias of Heraclea, empyema. This man being wounded in the lung in a certain battle carried the weapon in his body eighteen months and discharged sufficient pus to fill sixty-seven porringers. When he slept he saw a vision, the god extracted the spear-point from his lung and placed it in his hands, and

at daybreak he went away whole, taking the weapon with him.

The rest of the pillar is very fragmentary, and though largely restored by ingenious philologists need not detain us; but, together with the above pillars, another votive epigraph was discovered, five centuries later in date, and forming an instructive contrast to them:—

"Under the priesthood of P. Ælius Antiochus. I, M. Julius Apellas, of Idrias and Mylasa (towns in Caria), was sent here by the god, often falling into diseases and being troubled by indigestion. Now, on the voyage, while in Ægina, he bade me not lose my temper so often, and when I came to the temple he commanded me to cover my head for two days—it rained during that time—to take bread and cheese with celery and lettuce, to wash myself with my own hands, to exercise running, to drink lemonade (water with the tops of citron, *κίτριον τὰ ἄκρα*, in it); to walk on the roof, swing, rub myself with sand, go barefoot; to pour wine into the hot bath water, to wash myself, and pay the bathman a drachma; to make offerings to Asclepios, Epione and the Eleusinian goddesses, and to take milk and honey. One day when I took milk only the god said: 'Put honey in, that it may act as a laxative'. But, when I asked the god to cure me more quickly, I dreamt I was rubbed all over with salt and mustard, and that I was led out of the chamber by a boy with a censer, while the priest said: 'You are cured, now pay the fee'. So I did as I dreamt; when I rubbed in the salt and mustard it was painful, but the pain went off after washing. So it happened during the first nine days. Then he touched me (in a dream) on my right hand and breast, and the next day, as I sacrificed, the fire burnt my hand so that it blistered, but it soon recovered. Then, as I still waited, he bade me rub in oil of anise for headache; but I had no headache. Still the oracle was true, for I got a headache as a result of philosophic studies, and when I used the oil it departed. For quinsy and sore throat (for I besought the god for this also) he recommended gargling with cold water. And he bade me also write this down, so I departed thankful and cured."

The above cases show that Asclepios did not confine himself to curing the sick, and this is evidenced by another inscription of the same date as the pillars, which throws much light on the

mythology of the deity. Isyllos, a sickly youth from Bosporus in Argolis, went in the terrible year B.C. 338 to the temple and prayed for health. The god appeared, but he was dressed in shining armour, and said he had no time to attend to patients as he was off to Sparta to defend the City of Lycurgus against Philip of Macedon. So Isyllos went there to tell the joyful news, and on the retreat of the enemy the Spartans instituted a yearly festival in honour of the god. In after years Isyllos wrote a long poem in praise of Asclepios and set it up in the temple.

Some writers try to account for the wonderful cures above noticed by supposing that the priests were remarkably skilled in mesmerism and surgery; a simpler explanation will probably occur to most readers. The question for us, however, is: What has this dream oracle, with its dogs and snakes and bare-faced quackery, to do with the Hippocratic medicine? The old theory was that Greek medical science had its origin in the temples, and that the early physicians, especially those called "Asclepiadæ," were priests of Asclepios. Hippocrates himself was supposed to be such a priest, who by the strength of his genius finally separated medicine from theology. Some of the reasons for rejecting this are given in the text, and they are strengthened by all recent discoveries. The above inscriptions, for instance, seem to indicate the very opposite process. The earlier cases (those recorded on the pillars) are purely theurgic; they are intended to show the direct action of the deity, and form a most striking contrast to the Hippocratic writings with which they were contemporary. Their whole spirit is obviously antagonistic to any attempt at rational medicine or medical teaching. Apellas, on the other hand, received much the same treatment at Epidaurus as he would have had from a Methodic physician, or perhaps even from Galen himself. The priests seem to have found that pure miracles did not pay, and so gradually added as much medicine as was possible without entirely obscuring the divine element. What is known of the priests themselves is gathered mainly from inscriptions found on the site of the temple of Asclepios at Athens. We learn from these that the priests were chosen yearly by lot; and, of the numerous names which have been preserved, one only has the additional title of physician, facts which conclusively prove that the priests of Asclepios were not necessarily medical men.

The evidence from the side of the physicians is of the same kind. We know about a dozen practitioners (including Hippocrates and his sons) who are called Asclepiadæ. Not one of them is ever spoken of as a priest, nor are they ever found in temples of Asclepios. The books of the Hippocratic collection were probably all written by members of the Asclepiad guild; but the name of the god is only once mentioned, in the famous Oath, where it is connected with those of other deities. Yet the writers do not ignore the gods. Even the free-thinking author of the treatise on epilepsy says that an epileptic should pray for health. "Certain interpreters of dreams (says the writer of the treatise on regimen) tell their patients to pray to the gods only. It is very meet and right that a sick man should pray to the gods, but he should help himself at the same time." He afterwards gives a list of gods who may be prayed to, but Asclepios is not among them. This neglect of the special god of medicine, incredible in the case of his own priests, is strange in any case, but may perhaps be partially explained by considering the history of his worship. Asclepios seems to have been a Thessalian earth god, who revealed himself to his sleeping worshippers (especially when sick) in woods, caves, and near springs. As early as the ninth century his fame had spread to the Ionian Greeks, who, however, looked upon him merely as a petty chief of Thessaly skilled in medicine. But the neighbouring Dorians had already adopted his worship, converting him into a son of their own national deity, Apollo, and they brought him with them in their southward migration. By them the worship of Asclepios was introduced into other branches of the Greek race, the various local health deities, Hygeia, Panacea, etc., being converted into his children, just as he had become son of Apollo. Now, Cos and Cnidus, though nominally Dorian colonies, were largely inhabited by Ionians; the Hippocratic treatises are written in a dialect closely allied to the Ionic, and the authors (the Asclepiadæ) seem to have held the Ionic view of Asclepios, *viz.*, that he was a mere man, the founder of their guild, and the direct ancestor of its more prominent members.

NOTES.

The inscriptions are translated from the originals published in the *Ephemeris Archæologike*, 1883-85. In the case of Apellas I have been

much assisted by the commentary of Konrad Zacher, *Hermes*, vol. xxi., and the translation of Wilamowitz Möllendorf, *Isyllos von Epidauros*, 1886. There is a complete French translation by Reinach, Revue Archéologique, 1884-85. See also Girard *L'Asclepieion d'Athenes*, Paris, 1881.

APPENDIX III.

Mediæval Monastic Medicine.

The obscurity which covers the origin of Greek medicine, and its revival in the West during the middle ages, tempted the earlier historians of our art to seize upon any plausible explanation which presented itself, and they declared that the first had its source in the temples of Æsculapius, and the second in the monasteries of St. Benedict, especially through the foundation of the school of Salerno by the monks of Monte Cassino. This latter theory, though maintained by no responsible historian since Puccinotti, is still repeated by uncritical compilers, and it may be worth while to enforce the reasons against it taken from the history of the school (see p. 185) by a brief examination of the subject from the side of the monastery.

Our knowledge of the early history of Monte Cassino is derived mainly from the writings of two of its monks, Leo, afterwards Cardinal Bishop of Ostia, who entered the monastery in 1060, and Peter, the deacon, who lived half a century later, and not only continued his predecessor's chronicle, but also wrote a series of biographies of illustrious abbots and monks. Both historians are proud of their monastery, and are careful to record every case in which it took part in external affairs; they wrote at a time when Salerno was at the height of its fame, the admiration of Europe; and, if the monastery had any claim to be the mother of the school, they would hardly have omitted to say so. For they by no means disregard medical matters, and speak with much admiration of Constantine, the African; but the other notices are very scanty, and there is not the slightest hint of anything approaching a school of medicine. Leo tells us that Abbot Bertharius wrote many works both in prose and poetry,

and among the former were two *Codices of Medical Receipts Compiled from all Sources*. Peter gives a similar list, but omits the receipt book, which probably perished with its author when the monastery was destroyed by the Saracens, 883. It was restored in 960, but affairs were in such disorder, owing to the lands being laid waste or appropriated by neighbouring nobles, that the monks for a long time had hardly leisure for their religious exercises, and we hear little of literature and nothing of medicine till the famous abbacy of Desiderius (1058-87). Desiderius was a noble Lombard whom his friends wished to marry, but who fled from his bride to a monastery, and there chastened himself with prayer and fasting till he got so ill that he had to go to Salerno for medical advice. Here he made friends with a medical student, Alphanus, with whom he proposed to go on a pilgrimage to Jerusalem. But first they went to see the Pope (Victor II.), whose favour Alphanus obtained "by his beautiful voice and his skill in medicine," and on his advice they retired to the monastery of Monte Cassino. Desiderius finally became Pope Victor III., and Alphanus Archbishop of Salerno. There is no evidence that Desiderius studied medicine at Salerno, and the long lists of his writings given by Peter contain nothing medical. Sprengel, who is determined to make him a doctor at any price, transfers to the abbot what Leo says of Alphanus, and adds that he wrote on the *medical* miracles of St. Benedict: so says Peter, the deacon, but he omits the word medical.

The only monks of Monte Cassino of whom there is good evidence that they were "skilled in medicine" are Alphanus and Constantine. Both were physicians before they were monks, and they went from the school to the monastery, not from the monastery to the school.

The famous cure of the emperor, Henry II., called "The Saint," is adduced by Sprengel and others as a proof that the monks possessed great skill in surgery. It is related by numerous chroniclers, some of them contemporary, and the usual version is the following: In 1014, St. Henry, then German king and emperor-elect, being grievously tormented by stone, *for which the physicians could do nothing*, came to the monastery of Monte Cassino and earnestly invoked the intercession of St. Benedict. He slept and saw a vision. St. Benedict appeared to him, and

with a surgeon's knife (*ferro medicinali*) opened the place where the stone was, took it out, placed it in the king's hand, and immediately healed the wound. The king awoke, and finding the stone in his hand called the bishops and princes, and told them what great things God had done for him. Then, having presented royal gifts to the monastery, he departed rejoicing, and came to Rome, where he told the story to Pope Benedict VIII., who rejoiced with him and crowned him Cæsar and emperor, 14th February, 1014. This story, like the cures of Æsculapius which it closely resembles, is susceptible of other explanations than that of a mesmerising surgical monk, and one such may be found in a recently discovered letter from Pope Benedict VIII. himself, which agrees with the version given by Leo of Ostia, and forms such an excellent example of how medical miracles were developed that I venture to translate it in full:—

"We, Benedict, bishop, servant of the servants of God, would have it known to all faithful Christians, as well prelates as those under them, that our spiritual son, Henry, the emperor, came to the monastery of St. Benedict, which is on the hill called Castro Cassino, where is buried the most blessed body of the most blessed Benedict, which place he beheld with great devotion, and said he had never seen a more awful or venerable sanctuary. Nevertheless he was troubled by some scruple of doubt as to whether the blessed Benedict was actually buried there or no. But being not fully asleep from pain by which he was grievously tormented, nor yet fully awake, the most blessed Father Benedict appeared to him and asked where his pain was, and when he had fully explained it the most blessed Benedict said: 'I know thou hast hitherto doubted whether I rest here, but this shall be a sign to thee that my body and that of my sister are in this place. When thou arisest this day thou shalt pass three large stones, *in egestione urinæ tuæ*, and thenceforth shall be free from pain; and know that I am Brother Benedict.' And with these words he vanished suddenly (*presto*). The emperor awoke, and at once rose and was healed according to the vision. In the morning he came to the assembly of brethren and said: 'What, my masters, shall I give to a doctor who has cured me?' And when they answered that he might take what he liked from the monastery, he replied: 'Not so; for, since the most blessed

Father Benedict has healed me this night, it is most just that I should recompense him from my treasury'. Adding: 'Now I know of a surety that this place is truly holy, and no one can doubt henceforth that the most blessed Benedict and his holy sister rest here'. And to prove his words he showed the three stones openly to all. Then he went to the shrine of the blessed Benedict, and offered him these gifts—a copy of the Gospels bound on one side with pure gold and most precious gems, and marvellously decorated within with uncial letters and gold figures; a gold chalice, and its paten, worked with gems and pearls and fine blue stones, together with a napkin of pure silk with gold inworked; also an orarium and cingulum, stola and pluviale, and other vestments, all adorned with gold-work. And he presented a silver bowl and cup from which the brethren might drink on festivals. Further, he redeemed from the Jews, who had them in pledge for 500 pieces of gold, an altar cloth of St. Benedict, presented by Charlemagne, and a silver chalice and paten sent once to St. Benedict by Theodoric, King of the Saxons. We also, of our littleness, to congratulate the emperor on his health, have laid on the altar of St. Benedict an excellent casula (*planeta*) of bluish colour, embroidered nevertheless with gold, and a stole with its mapula, worked with gold. And Archbishop Belgrinus has presented a purple casula, embroidered round the edge with the signs of the months in gold, and a stole and pluviale. Wherefore, I, the said Benedict, bishop, servant of the servants of God, together with the said emperor, beseech all who are called by the Christian name, by the Father Almighty, and by Jesus Christ, His only Son, our Lord, who was born, died and rose again for the salvation of the whole world, and by the Holy Spirit proceeding from both, and by the blessed Peter, prince of the apostles, who hath power to bind and to loose, that they presume not to remove any of the above treasures which the said emperor has dedicated in the said church for the redemption of his soul. Should any one (which we are unwilling to believe) treat this our prayer and entreaty as of no value, and rashly dare to take away any of the said articles, let him know that he is bound by the chain of an anathema, that he is alienate from the Kingdom of God, and that he is destined to be consumed in everlasting torments and burnings

with the devil and his abominable host, and with Judas the betrayer of our Lord Jesus Christ. But whoso shall show himself an observer of our apostolic injunction in this and other matters pertaining to the worship of God, may the grace of benediction be multiplied to him by the intercession of the most blessed Benedict, and may he be a partaker of everlasting life. Amen. There were concerned in this matter Puppo, patriarch of Aquileia, Belgrinus, Archbishop of Cologne, together with nearly all the bishops, archbishops and abbots of France and Italy."

At the end of the century Pope Urban II. had a pain in his side. He, too, doubted whether St. Benedict was buried at Monte Cassino; so he went there, and the saint appeared to him in a dream, and cured him. Then he wrote a long letter anathematising all who should in future doubt the genuineness of the shrine, and signed by himself, seven cardinals and six bishops, 1st April, 1092.

These cures, together with a few others recorded by Leo and Peter, are pure miracles, or, at any rate, were held to be pure miracles; and so far from indicating the existence of a medical school, or special medical knowledge among the monks of Monte Cassino, are diametrically opposed to any such idea. Indeed, there does not appear to have been the ordinary monastic school there, for Peter Damian, writing to Abbot Desiderius, after a visit to the monastery, says: "Among the flowers of virtue which I found in that fertile field which the Lord hath blessed, this pleased me not a little, that there were no boys' schools there, for they often enervate the rigour of piety".

But though there is no evidence that monks had anything to do with the origin of the school of Salerno, there was such a thing as a monastic medicine apart from miracles, and this may also be studied in the story of Monte Cassino. The great order of St. Benedict has always been honourably distinguished for the encouragement (within certain limits) of science and literature, and its founder, in striking contrast to the foremost of his followers (St. Bernard), declared that the care of the sick must be placed above all things ('Infirmorum cura ante omnia et super omnia adhibenda est, ut sicut revera Christo ita eis serviatur," Reg. 36).

The monastery of Monte Cassino possessed both an infirmary and a hospital. The former was intended for sick monks, and those who by reason of age were unable to follow the strict rules of the order. It formed a separate building at the foot of the hill, was presided over by the "infirmarius," and had a special endowment. Thus, in 1183, Pope Lucius III. confirms the possession of property, the income of which had been devoted to the "infirmarium" since 1050. The hospital, or xenodochium, was a place for the reception of strangers both sick and hale, and in 1147 King Roger of Sicily confirmed to Abbot Rainald the possessions of the monastery "xenodochium," which he describes as "the sole solace of the poor, and harbour of the stranger and the destitute" ("unicum egenorum solatium, peregrinorum et necessitatem habentium portum"). In 1215 Pope Innocent III. wrote a long letter to the abbot, recommending the reform of various abuses. If the "infirmarius" is incapable of attending to the aged monks, he must get a deputy (who may be a layman) to do it for him. The abbot is to take his meals with the monks, and not to gormandise every day with strangers in the hospital. The duties of the "hospitalarius" may conveniently be undertaken by a religious layman.

The physicians and surgeons of the great hospital, established by the military monks of St. John at Jerusalem, were not members of the order, but laymen who were paid for their services; and the superiority of the lay to the monastic medicine had shown itself as early as the tenth century. Rheims was then the most learned monastery in France, yet, when one of its monks, Richer, wished to study medicine, he tells us that there was no one there who could teach him, and he had to go to some "secular clerks" at Chartres. The following, in short, seems the most probable view of the relation of the monasteries to medicine. For a few centuries (from the sixth to the tenth) monks were almost the only persons in Western Europe who possessed or could read the works of the classical physicians; but they made little or no use of their advantages, and preferred to employ popular receipt books, and herbals, such as those described in chapter xxxiii. The revival of the ancient medicine came not from them, but partly from the school of Salerno, which was a lay institution, and especially from the Arabs, whose learning

was introduced rather by way of Spain than through the Crusaders.

We may conclude with a brief outline of medical practice in nunneries. St. Hildegard and her receipt book have been noticed in the text, but we know more about the Convent of the Paraclete, the abbess of which was the famous Heloissa (1101-64). There was no hospital. Anxious as she is to conform in all things to the rule of St. Benedict, Heloissa points out that there are obvious objections to the indiscriminate reception of strangers in a convent of females. Even to admit persons of their own sex might afford the less spiritually-minded nuns dangerous opportunities for communicating with the outer world. But there was an infirmary, and the following were the duties of the infirmaria as defined by Abælard:—

"Let the infirmaria look after the sick, preserving them at once from sin and from want (tam a culpa quam ab indigentia). Whatever their infirmity requires, whether in food, baths, or anything else, is to be given them. Meat is never to be withheld, except on Fridays and special vigils and fasts. The more they think upon their death the better they will be kept from sin, and especially should they study silence, and be instant in prayer, as it is written: 'My son in thy sickness be not negligent; but pray unto the Lord and He will make thee whole' (Eccl. xxxviii. 9), There must always be some one on duty to give aid when requisite, and the place must be provided with all things needed in sickness. Drugs also must be got if necessary, according to the opportunities of the locality, and this will be done the more easily if the presiding sister is not without medical knowledge. It is she also who must look after those who are bled, and some sister should be skilled in venesection, that it may not be requisite for a man to come in for this purpose. Opportunity for religious exercises must be provided, so that patients may communicate at least on the Lord's Day, always with confession and penance so far as possible. The recommendation of St. James, the apostle, as to anointing the sick must be carefully observed, especially in desperate cases. Let two elderly monks, with a deacon to carry the holy oil, come in and celebrate this sacrament, the sisters being present, but with a screen interposed. And the infirmary should be so built that the monks may have access and regress

without seeing the sisters or being seen by them. The deaconess and cellaress shall visit the sick at least once daily, and carefully provide for their needs spiritual and bodily, that they may merit to hear that saying of the Lord: 'I was sick and ye visited me'. When a sick person comes into the agony, she who attends her shall instantly run into the convent and beat a board, and the whole convent at whatever hour of the day or night shall hasten to the dying, unless prevented by religious exercises. In this case, since nothing must be put before the service of God, let the deaconess, with those whom she shall choose, go, and let the rest follow as soon as possible. And as they go, let them at once begin the litany as far as the invocation of saints, and then sing psalms or hymns suitable to the occasion. But how salutary it is to go to the sick or dead is pointed out by the preacher (vi. 2, 3)."

This passage is condensed by Lacroix *(Science and Literature of the Middle Ages)* into the somewhat misleading assertion that "Abælard exhorted the nuns of the Paraclete convent to learn surgery for the benefit of the poor," whence English writers have drawn pictures of the nuns running about the neighbourhood like so many parish nurses or ladies bountiful. Considering the care taken to exclude even female visitors, and to protect the nuns from the gaze of elderly monks performing a sacramental office, it seems hardly likely that such freedom would have been permitted, far less encouraged.

NOTE.

The chronicles of Leo and Peter are printed in Pertz, *Monumenta Germaniæ Historica*, vol vii. Peter's biographical work may be found in *Muratori*, vol vi. The letters of Popes Benedict, Urban, and Innocent are given in full by Tosti, *Storia della Badia di Monte Cassino*, Naples, 1842. The quotation from Abælard is from Migne's edition (in his *Patrologia*), p. 278, ep. viii.

APPENDIX IV.

THE "GALENIC" SYSTEM OF MEDICINE.

THE *Introduction to Medicine* (Isagoge) of Honain ben Isaac, or Joannitius as he was called by the Christians, contains such an

excellent account of the Galenic and mediæval medical theories, that it is worth while to give a complete translation of the Latin version, which formed one of the most popular text-books of the later middle ages :—

" Medicine is divided into two parts, theoretic and practical, of which the former has three divisions, the consideration of the naturals, the non-naturals, and the contra-naturals, upon which the knowledge of health and disease depends.

I. On the Natural Things.

The " naturals " are seven in number; elements, qualities, humours, members, faculties, operations, and spirits. To which some add four more, age, colour, figure and sex.

Elements are four: fire, air, earth and water. Fire is hot and dry, air hot and moist, water cold and moist, earth cold and dry.

Qualities are nine; eight unequal, and one equal. Of the unequal four are simple, hot, cold, moist and dry, and four compound, hot and dry, hot and moist, cold and dry, cold and moist. The equal is when the body contains a moderate amount of each simple quality.

The humours are four; blood, phlegm, yellow and black bile. Blood is hot and moist, phlegm cold and moist, yellow bile hot and dry, black cold and dry.

There are five varieties of phlegm. Salt phlegm is hotter and dryer than normal, and is infected with yellow bile; sweet phlegm is hotter and moister and is tinged with blood; bitter phlegm is colder and dryer and is influenced by black bile. There is also a glassy phlegm due to cold and coagulation and found in old persons where the natural heat is deficient. Fifth is the cold and moist phlegm with no special savour. Yellow bile has also five varieties (1) Reddish, clear, pure in nature and hot in substance whose origin is from the liver; (2) Light yellow due to excess of watery and phlegmatic humours; (3) Like yolk of egg due to admixture of coagulated phlegm; (4) Greenish like green leeks, originating from the stomach rather than the liver; (5) Green like copperas, and irritant, due to excessive heating of the bile.

Black bile is of two kinds, (1) the normal excrement of the blood, which is genuinely cold and dry, (2) abnormal, due to overheating, and of pernicious quality.

Members have four varieties; for there are some which are principal or fundamental such as brain, heart, liver; and others subservient to these, *e.g.*, nerves ministering to the brain, arteries to the heart, and veins to the liver. Thirdly, there are members which have special virtue due to their properties, as bone, membranes, muscles. A fourth variety have virtue of their own but depend also on the fundamental organs, *e.g.*, stomach, kidneys, intestines, for they absorb and digest food of their own powers but are endowed with sense, life, and motion from the principal members.

Faculties are three, natural, spiritual, animal. The natural faculty ministers or is ministered to; the former generates, nourishes, digests, the latter gives rise to the appetites. The spiritual faculty is also of two kinds, that which operates and that which is operated upon. The former causes the dilation and contraction of the heart and arteries, the latter is affected to anger, domination, care, etc. Animal faculties are three, the first orders, compounds, and discerns, the second gives voluntary motion, the third sensation. From the first proceed imagination (in the forehead), cogitation (in the mid-brain) and memory (in the occiput). The sensory faculties include sight, hearing, taste, touch and smell.

Operations are simple or compound. The former include hunger, due to heat and dryness, digestion, due to heat and moisture, retention, to cold and dryness, expulsion, to cold and moisture. Compound are desires which are made up of appetites and sensations.

Spirits are three; natural, taking origin from the liver; vital, from the heart, and animal, from the brain. The first is diffused through the body by the veins, the second by the arteries, the third by the nerves. These are the seven natural things.

Ages are four, adolescence, manhood, advanced age and senility. Adolescence is hot and moist, marked by growth, and continues till the twenty-fifth or thirtieth year. Manhood is hot and dry, the strength being maintained without diminution till the fortieth year. Advanced age, cold and dry, in which the

body begins to decrease without affection of the faculties, it persists till fifty-eight or sixty. To this succeeds senility, cold and moist, with excess of phlegm and deficient faculties, which ends with life.

Colours are of two kinds, due to internal or external causes. Internal causes act in two ways by equability of humours, or excess. The former gives red and white, the latter yellow, black, red and white, according as yellow bile, black bile, blood or phlegm respectively predominates. External causes are temperature, as cold among the Scotch (*sicut ex rigore Scotis*) and heat among the Ethiopians. There are also spiritual colours due to fear, anger and other mental affections. Colours of the hair are four, black, red, glaucus (?) and white. Black is due to abundant overheated bile or blood, red to the same less heated, glaucus to excess of black bile, white to deficiency of the innate heat, and is therefore found mostly in the old. Colours of the eye are four, black, whitish, varius (?) and glaucus (?) The tunics of the eye are seven, and its humours three. The first tunic is the retina, the second secundina, third sclerotic, fourth tela aranea, fifth uvea, sixth cornea, seventh conjunctiva. The humours are the vitreous, the crystalline, and the albugineous which is in front of the uvea (*iris ?*)

Figures or qualities of the body are five, fatness, thinness sinthesis (?) squalidity and equality. There are two kinds of fatness due to excess of flesh or of fat, the first is caused by over heat, the second by coldness of the humours. Leanness is due to heat and dryness, sinthesis to cold and dryness, squalidity to cold and moisture, equality to an equilibrium of humours and qualities. Sexes: The male differs from the female in being hotter and dryer.

II. The Six Non-Naturals.

(i.) Changes of air are five, due to seasons, constellations, special winds, localities, soils. Seasons are four, spring hot and moist, summer hot and dry, autumn cold and dry, winter cold and moist. The nature of the air is also changed by the planets, for it becomes hotter when they approach the sun and *vice versâ*. Winds are four: south, hot and dry; west, cool and moist; north, cold and dry; east, hot and moist. Localities are four, height,

depth, vicinity to mountains, or the sea. Altitude is cold, depth, hot, if mountains are to the south the locality will be cold, for they keep off the hot winds, if north the reverse. Rocky soil is cold and dry, loamy, warm and moist, clay, cold and moist, etc. Exhalations from marshes infect the air and cause disease and pestilence.

(ii.) Exercise if moderate maintains warmth, if excessive it heats and is followed by cold and dryness. Rest if excessive increases cold and moisture. Baths are of sweet water or other. The former soften the body and heat or cool it according to their temperature. Salt baths cause dryness. Bitter or sulphurous heat and dry the body, aluminous or gypseous cool and dry it.

(iii.) Food is of two kinds, good and bad. Good food is that which forms good humours, and *vice versâ*. Fresh fermented bread, flesh of lambs and kids are good; bread, old and unfermented, and meat of old oxen, goats, etc., are bad foods. Each kind may be heavy or light. Meat of swine and oxen is heavy, that of fowls and fish light. Some vegetables generate bad humours, *e.g.*, nasturtium, mustard, garlic, form bile; lentils, cabbage and old animals produce melancholia; porkers, lambs, purslain and atriplex (?) generate phlegm. Excess in heavy foods generates phlegm and black bile, light food yellow bile; both are bad.

Drinks are of three kinds: (1) pure, such as water, (2) containing food, as wine, (3) partaking of both these characters, as syrups and drinks given in disease.

The use of food is to supply the waste of the body; that of drink to carry the food through the body.

(iv.) Sleep changes the body by cooling it without and warming it within; waking does the reverse.

(v.) Coitus hoc praestat corpori; siccat corpus et minuit naturalem virtutem, ideoque infrigidat, multototies vero ex multa concussione corpus calefacit.

(vi.) Affections of the mind produce changes by bringing the natural heat from the interior to the surface either impetuously, as in anger, or gradually, as in joy and pleasures. Other affections retract the natural heat rapidly, as in terror, or gradually, as in care.

III. The Contra-Naturals.

There are three things against nature (*res contra-naturales*): (1) ases, (2) their causes, (3) their sequels.

Disease is that which injures the body directly without any intermediate agent, as heat in continued fevers. Fever is abnormal heat passing from the heart to the arteries and causing harmful effects. It has three varieties: (1) situated in the spirit, called "ephemeral"; (2) in the humours, which putrefy, and therefore called "putrid"; (3) in the solids and therefore called "ethic," (? hectic). Putrid fevers are of four kinds: (1) in the blood "synochal" or "continued"; (2) in the yellow bile, tertian; (3) in the phlegm quotidian; (4) from putrid black bile; this is called quartan and recurs with two days' intermission.

Inflammations. There are four simple inflammations: (1) from blood, called phlegmon; (2) from yellow bile, called erysipelas; (3) from coagulated phlegm, called undimie (? œdema), that is, tumour; (4) from black bile, and these are called cancers. The signs of a blood inflammation are pain, heat, redness and swelling, with a hard pulse; those of a bilious phlegmon, pricking pain, heat, yellowish-redness and rapid spreading; a phlegmatic inflammation is shown by whiteness, softness, impressibility and absence of pain; cancers are characterised by hardness, blackness, absence of sensibility.

There are three classes of disease: (1) of similar parts; (2) of organs; (3) universal (see p. 98).

Diseases of similar parts are eight, four simple and four composite. The former are due to heat, moisture, cold or dryness solely, the latter to these combined, *e.g.*, heat and moisture, etc. Each of the eight kinds has two varieties, for it is either *ex qualitate simplici*, or with admixture of some humour. Examples: "Ethic" fevers are simple hot diseases; putrid fevers are hot diseases with admixture of some humour. Frostbite (*algor*) due to very cold air or snow, is a cold disease, *ex qualitate simplici;* paralysis, partial or entire, is a cold disease dependent on some humour. A wound (not inflamed) is a moist disease without admixture of humour. Dropsy is a moist disease affecting the humours. Hard and dry cancer is a dry disease affecting the humours.

Organic diseases are of four kinds: (1) maldevelopments, *e.g.*, inconvenient size of head; absence of hollows, as in flat foot; stricture, or too large size of canals; roughness, as of throat or bronchi; smoothness, as in the stomach. (2) Abnormalities in

number, *e.g.*, lumbrici, ascarides, warts (!), absence or excess of fingers. (3) Abnormalities of size, *e.g.*, tumours; (4) of position, due to want of proper relation to surrounding parts, *e.g.*, hare lip, webbed fingers. Fractures, wounds, excoriations, and amputations are also to be classed here.

Qualities of the body are three, health, sickness, and neutrality. Health is the maintenance of the normal temperament, or the preservation of the "naturals" according to the course of nature. Disease is "intemperantia ex cursum naturæ, naturam lædens, unde fit læsionis effectus sensibilis". Neutrality is a condition which is neither health or disease. There are three kinds of neutrality; (1) when health and disease coincide in the same body, as in the blind or lame; (2) in old age where there is general infirmity; (3) in persons ill at one time, and well at another, thus those of cold temperament are ill in winter and well in summer, and persons of moist nature are ill in childhood, and become strong in adult age.

Health, sickness, and neutrality express themselves in three things: (1) in the body in which one of them occurs; (2) in the influences which produce them; (3) in the symptoms which indicate them.

Influences are of two kinds, natural, and against nature. The former are either conservative, and pertain to the maintenance of health, or active, pertaining to the cure of disease. The latter tend to produce disease or neutrality. All influences, whether concerned with health or disease, are of six kinds (*i.e.*, the six "non-naturals" above mentioned). These, if in fitting moderation as to quantity, quality, time and order, tend to maintain health; but if in excess, they become causes of disease.

Causes of disease are of three kinds: (1) primitive and external, as cold or heat; (2) accidents within the body, as repletion or inanition; (3) those called conjunct because when they are present the disease is present, as putridity in fevers.

Diseases due to heat are five: (1) from commotion of the spirits, as in anger, or of body, as in severe exertion; (2) direct and visible action, as sunstroke; (3) heating of the body by irritant foods; (4) blocking up of pores by cold; (5) fevers.

Those caused by cold are eight: (1) visible action, as frost bite; (2) effect of "cold" drugs, as opium; (3) extinction of natural

heat by excess; (4) by defect of food; (5) blocking the pores by cold humours, whereby the innate heat is diminished; (6) loss of natural heat by abnormal evacuations; (7) extreme perspiration from over-exercise; (8) idleness.

The causes of dry diseases are: (1) injection of dry substances from without, astringents etc., vinegar, salt, mustard; (2) deficient food and drink; (3) over-exercise.

Moist diseases are caused: (1) by external moisture, as baths; (2) moist foods, as fish; (3) excessive food and drink; (4) idleness.

There are four kinds of diseases due to abnormal motion of humours from one part to another, due: (1) to excessive vigour of impelling and debility of receiving part; (2) excessive quantity of humour; (3) debility of the nutrient faculty; (4) abnormal size of pores.

Diseases may also originate: (1) in the embryo; (2) from faults of the mid-wife or nurse, *e.g.*, if a child be allowed to walk before the fit time; (3) from faults of the physician, if he sets fractures or applies bandages unskilfully; (4) from fault of the patient if he removes dressings or bandages before a wound or fracture is healed.

Constriction, and dilation of pores, smoothness and roughness (*lenitas et asperitas*). Constriction is of three kinds: (1) simple constriction, (2) carnosities, (3) impaction. The first may be due to excess of the retentive and debility of the expulsive faculty, or to cold, dryness, or mechanical pressure. The second includes tumours and contractions due to scars. The third may be caused by thickened humours, stones, or coagulated blood. Dilation is due to three causes: (1) excess of the virtus expellens, with debility of the virtus retentiva; (2) abundance of humour; (3) aperient medicines. Smoothness may be produced from within, as by mucus, or from without, as by ointments. Similarly roughness is caused by internal acrid humours, or externally by smoke, powders, etc.

Excess of organs is due either to superfluous humours, or excess of the formative faculty (*virtus formativa*). Diminution of organs may be internal because of diminution of humours, or external from cold, burning, incisions, and putrefactions. Putrefaction is caused either by injection of some putrefactive matter (ex

potione mortificante aut putredinem faciente) or from constriction, and retention of corrupt humours.

Displacements of organs have two causes: (1) intrinsic, due to slipperiness and loss of equilibrium produced by solvent or lubricating humours or muscular spasm, or to ventosities and tumours of neighbouring parts. (2) Extrinsic, *e.g.*, incisions, as by a sword; dragging, as by a rope; or bruising, as by stones; also fractures and over-exercise. And they are of two kinds: (1) separation of parts normally joined; (2) junction of parts normally separated.

Symptoms are of three genera; those of health, of disease, and of neutrality. Each genus has two species: (1) referring to the organs, (2) to the similar parts (tissues). Symptoms of similar parts are of two kinds, substantial and accidental. Substantial symptoms are heat, cold, dryness and moisture. Accidental symptoms are those noted by touch, as hardness or softness; by sight, as colour, and changes in function. Symptoms of organs are also two, substantial and accidental. Substantial are four; ars (?), modus (?), number and position. Accidental symptoms are likewise four; good and bad quality, perfect and imperfect function.

Signs are of three kinds: (1) those which show past events, called cognitive or agnitive, *e.g.*, when we see the body is wet we know there has been sweating; (2) showing what is present, called by Galen demonstrative, as when we diagnose fever from a large and quick pulse; (3) signs of future events, as when the lower lip quivers we judge vomiting will occur, which is called "processio significativa".

There is a distinction between signs and symptoms, and what are symptoms to the patient may be signs to the physician.

Significative symptoms are of three kinds: (1) changed functions, *e.g.*, indigestion; (2) altered quality, *e.g.*, jaundice; (3) changes in exertions, *e.g.*, black urine. Functions may be altered in three ways: entirely, as indigestion; partially, as dim sight, slow digestion (dyspepsia), etc.; in quality, as acid or flatulent digestion, or spots before the eyes like wood or flies, or obscurity of part of the visual field. Changes of quality are four: (1) those discovered by sight, as jaundice, black tongue, etc.; (2) by odour, foetid breath and sweat; (3) by taste, salt, bitter, acid; (4) by touch, hard or soft.

Excretions may occur with or without sounds; with sounds as eructation, internal rumbling, *vel per anum ventus*. Those without sound may be abnormal in three ways, in quantity, as dysentery, in quality, as black water, or in both, as hæmorrhage.

Alterations in organs show themselves internally or externally. Internal changes are six: (1) changes in functional activity; (2) from excretions (?); (3) pain locally; (4) pain in neighbouring organs; (5) abnormal mobility; (6) peculiar feelings in the patient. External changes are three: (1) those noticed by the eye, *e.g.*, blackness or whiteness; (2) by the touch, hardness or softness; (3) by both, change in size. Proximate causes of disease are three: lesions, change of quality, "habitudo inconveniens" of an organ. A medicine operates in one of three ways. It preserves health; it cures disease; or it does the reverse, (*aut e contrario*).

Regimen of health (hygiene) has three divisions according as it deals with those liable to illness, actually ill, or in feeble health (*defecti*). The first we treat by regulation of the above six things (*i.e.*, the "non-naturals"). The second we treat in two ways: (1) by removing excessive or morbid humours; (2) by correcting any errors in the six things. "Defecti" are infants, old people and convalescents.

Therapeutics are: (i.) general, (ii.) particular. (i.) Deals with the proper ordering of the six non-naturals; (ii.) has three divisions according as it deals with (1) similar parts, (2) organs, (3) lesions. In lesions of similar parts (wounds, fractures and dislocations) we reduce them to their normal position, and keep them so by bandaging. If there is defect of the virtus contentiva we use fomentations and poultices, if of the virtus expulsiva, diaphoretics and aromatics. Inflammations we cure by bringing them to maturity. Abnormal functions we deal with by medicaments or operations. If there is a new growth we remove it (*ipsam delemus*) either in part, as scrofulous swellings, or entirely, as cancers. If caused by excess of blood it is to be removed (the patient is to be bled?) at all ages. Smallness of members is treated by exercise and fomentations, excessive size by rest and constriction. Displacements we treat in two ways; by joining what is separated, or separating what is joined. For the former four things are requisite, to join the separated parts, to hold them together, to

prevent future displacement, and to maintain the nature of the place (*naturam loci custodire*).

Practical medicine is divided into three parts: (1) regulation of the above six things; (2) giving drugs; (3) surgery. Drugs are applied internally by the mouth, nose, ears and other openings, or externally as by plasters and poultices. Internally medicines act in three ways: (1) they loosen; (2) bind; (3) alter, as cold water in fevers. Surgery has two divisions: (1) concerning the soft parts, *e.g.*, incisions, suturings, cauteries; (2) concerning the bones, consolidating, uniting and scraping.

Discrimination of drugs is of five kinds: quality, quantity, time, order, *boni malive discretio*.

The end of the book of introduction by Joannitius. God be praised!"

APPENDIX V.

ENGLISH MEDICAL PRACTITIONERS BEFORE LINACRE.

THE brevity of the present work has compelled the writer to confine himself for the most part to the representative physicians of various ages, and to omit many names which might be looked for in a larger history. Among these are the earlier practitioners of our own country, Gilbert the Englishman, John of Gaddesden, and John of Arderne, who, though they can hardly be said to have had any definite influence on the progress of medicine, cannot be entirely passed over in a book intended for English readers. The little that is known of their lives may be found in the *Dictionary of National Biography*, and we can only notice here the more interesting parts of their work.

Gilbertus Anglicus, the earliest and ablest of the three, flourished in the middle of the thirteenth century, and is largely quoted in Pope John's *Treasury of the Poor* (see p. 204). The puppy-dog ointment for gout there noticed is not given in his only printed work the *Compendium Medicinæ*, but I find a very similar remedy for rheumatism, or cold arthritis, as he calls it: "Take a puppy of thirty days, kill it and anoint the painful place with its blood. Then cook the flesh and bones in wine, pound it up,

and press out the juice, to which add rue fennel, sage, agrimony, betony, stag's marrow and a little frankincense; it is excellent."

The great remedy for gout (*arthretica sanguinea*) is bleeding. "I will tell you what I saw in the case of a certain woman who complained and cried out about her right wrist, where was an inflammation, hot and red, with much swelling. She was a fat, full-blooded woman, who lived upon milk and meat; so I bled her from the basilic vein of the left arm, and the saphenous of the right foot in the same hour, to half a pound. Then I gave her food, and after three hours extracted another half pound from the saphena vein. In the same hour the pain and throbbing ceased and the woman asked me to bleed her again from the left arm, for she felt great relief from it. But I wished to draw the morbid matter downwards for two reasons, one of which need not be given here, and another which it is very necessary for a physician to bear in mind. When I was treating a man for sanguineous arthritis with pain in the right wrist, I asked first whether he had had pain in the other wrist or in the feet, and he said he had had a similar affection of his left arm, but never in the feet. Wherefore I refrained from bleeding in the left arm, and bled him in the right foot. But a physician who had treated him before, bled him in the right arm for inflammation of the left, which stopped the pain there, but made it pass over to the right with greater inflammation than the other. So, when I asked him the question he saw that I knew more physic than the other doctor. But to return to the woman. Three hours after the third venesection I again extracted half a pound of blood from the saphena vein, and that night she slept, which she had not done for many nights. I used no other treatment except low diet, and on the third day she was well. Wherefore we should always begin the cure by bleeding."

"On moles and warts. These are superfluities of flesh, appearing on the hands and feet but sometimes also on the face and whole body, due to an excessive expulsive force of the humours, and deficient convertive force of the skin. Some are soft and painless, and are formed of phlegm, others hard and dense of black bile, a third class, large, hard and reddish are due to blood, and a fourth variety very small with much itching are called mirmici, from mirmo, an ant. When they occur all over the

body they are often an early sign of leprosy. Warts may be removed by the knife or cautery, but general treatment to expel the noxious humours should always precede local. Make an incision into the back of a red snail, put salt therein; the juice which exudes will heal warts. So will the milky juice of the fig tree or of euphorbium (wolf's bane), also a plaster of powdered orpiment and vinegar; or ignite a piece of cotton wool (? *bombax*) over them. Finally si aqua super mortuum stante laventur, curantur." "Oil of lilies is an excellent remedy for ladies whose lips have become fissured through the kisses of their friends (*ex basiis amicorum*)." Perhaps in some cases the mercurial ointment he prescribes for scabies would have been more effectual: "An ointment for ringworm of the scalp, sulphur, mercury, and yolk of egg, of each equal parts".

The chapter on leprosy is very interesting, but too long to quote. The following are the chief causes of the disease: (1) heredity; (2) conception during the menstrual period; (3) infection, particularly *ex coitu cum muliere impudicâ;* (4) diet. "According to Avicenna, feeding on milk and fish, or bad pork may produce leprosy."

Gilbert is a decided Arabist, his favourite authors being Constantine, Avicenna, and Isaac Judæus, but he makes the interesting remark that, were it not for the singularity of the thing, he would prefer to follow the methods of Hippocrates.

John of Gaddesden, who flourished at the beginning of the fourteenth century, was a Fellow of Merton College, Oxford, and became prebendary of St. Paul's in 1341. He wrote his *Rosa Anglica* between the years 1305-17, probably near the later date, for he quotes the works of Bernard of Gordon and Henry of Mondeville, which we know were commenced in 1305 and 1306 respectively, while Guy of Chauliac, writing about 1363, speaks of the book as a comparatively recent production. "Last of all there arose a scentless *Rosa Anglicana* which was sent to me. I thought to find in it an odour of suavity, and I found the fables of Hispanus (Pope John), Gilbert and Theodoric." Haller passes a still severer judgment upon him, which may be given in the terse vigour of the original: "Empiricus homo, plenus superstitionum, apprime indoctus, arcanorum amans et laudator, lucri cupidus, rei culinariæ peritus". We must admit that these strictures

are not unjustified, and the great popularity of the work was due less to its scientific value than to its lively style and the large space devoted to culinary and sexual matters. Here are a few extracts :—

" A belt for the colic. Take the skin of a sea-cow and make a girdle; make its buckle of whalebone and the strap (?) of whale-tooth, if it can be got, or of the same whalebone. Whoever wears this belt will never have colic. This is certain and was proved by me in the case of a monk for whom I procured such a belt, and who was continually troubled by colic before he had it. That sea-cow is a hairy beast, and is called in English *Zele*."

" To make penidia. Take good white sugar one pound, and put it in a dish with enough water to cover it. Heat it over a clear, smokeless fire, and keep stirring till the water is nearly gone; if strong threads form on drawing out the spoon, it is a sign that it is cooked enough. Then take a marble slab, anoint it with oil of sweet almonds, and pour the sugar thereon. Work it up while still hot with the hands, gathering it from the sides to the centre, and finally draw it out like an electuary. Drive a large nail into the wall high up, throw the mass over the nail, and proceed to draw it out, working and twisting it. Be by the fire, especially in winter, that it may be the more readily extended. Cut up with scissors quickly before it grows hard and preserve in a cool place. They are excellent in fevers, phthisical coughs and hoarseness. Some add one ounce of honey to the sugar, and the penidia are then not white but reddish; others put in starch, and others sugar candy, but the first way is the best and simplest.

" Stones may be found in almost every cavity of the body, I saw a stone in my father's mouth under his tongue, the length of half a little finger, which I have exhibited in the schools and still carry about with me. I cured him by gargles, lotions and extracting it with a fine knife; though at first I knew not what would be the result, and because I found a hardness I thought it was an inflammation. But I knew my father had always been fond of fruits and milk foods, and that he was of a choleric temperament, so I conjectured it was a stone formed from viscid matter generated by the milk foods, and congealed by the heat

of his temperament, for that is a cause of stone." This is not the first mention of salivary calculus, for Avenzoar (*Theisir*, ii. 2) says: "I saw a stone formed under a man's tongue which hindered his speech. On its removal he recovered his speech. It is generated by gross humours which gradually harden till they are like stone."

The assertion that Gaddesden was the first English court physician appears to rest upon the well-known account of how he cured the king's son of small-pox. This is so often quoted in English that we may here give the author's own words. "Capiatur ergo scarletum rubrum, et qui patitur variolas involvitur in illo totaliter, vel in alio panno rubro; sicut ego feci quando Inclyti Regis Angliæ filius variolas patiebatur, curavi ut omnia circa lectum essent rubra, et curatio illa mihi optime successit, nam citra vestiga variolarum sanitati restitutus est."

Gaddesden's love of lucre is shown by his devoting a special section of his work to "disagreeable diseases which the doctor can seldom make money by," and the same characteristic is unpleasantly evident in the writings of the first important English surgeon, John of Arderne.

John of Arderne was born 1307, and practised from 1349 to 1370 at Newark. Then he went to London, and wrote surgical treatises of which, however, only a small part has been printed in an English translation by J. Reid, 1588.

Though he often quotes his predecessors, such as Gordon, Lanfranc and the Salernitan Platearius, he relies largely on his own experience of which the following is an example: "There was a man smitten on the shin, but the skin was not broken; but after the third day it swelled and began to grieve him; then he went unto one unskilled, until he had in his leg a great round hole and deap (*sic*) and full of black filth like unto burnt flesh. So when he came to me I cured him thus. First I washed the place with white wine warmed, in which was sodden croppes of the herbe colewort, and juice of plantain. Afterwards I put to a plaster made of plantain, ruberbe, parsley, honey, rye meal and white of egg mingled together: the place being mundified I put to powder 'creoferoberon' with a plaster of black soap, sulphur and arsenic. If any man be smitten on any part of the leg violently without wounding, as often happens either by a horse or a stone

or club or such like, it is good in the beginning to anoint the place and bring out the bruised blood thereof, and after to apply plasters repressing the pain and swelling. . . . Take for your cure as much as you can get, with good assurance for your money when you have done."

According to Arderne he was the only man of his time in England or beyond seas who could cure fistula in ano. He describes two methods by incision and ligature, and a number of instruments of his own invention, which appear, however, to be merely old forms under new names. He declares that he never took less than 100 shillings for the cure, while from great and worthy men he required 100 marks (£68 13s. 4d.) together with an annual pension of 100 shillings; immense fees considering the value of money at that time. But John of Arderne (says Malgaigne) was not content with boasting himself the inventor of two operations for fistula in ano, perfectly well known to his predecessors. All the world does not suffer from fistula, and to make money quickly one must find something of universal application. So he declares that everybody would be immensely benefited by taking an enema twice or thrice yearly. And it is no use to go to the Italians for this purpose. The operation requires a perfect master of the art, such as himself, assisted by appropriate instruments, such as the new and improved syringes which he has invented, and he concludes with a list of fees.

The work of Bernard of Gordon is considered here, not because there is any evidence that he was of British origin, for, in spite of such authorities as Haller and Puschmann, there seems no reason to doubt the unanimous assertion of French historians that he was born at Gordon in Guienne, but because his *Lily* gave rise to Gaddesden's *Rose*, which it at least equals in scientific value.

All that we really know of him is to be found in the preface to his *Lilium Medicinæ*, which, he says, he began to write in 1305 having then been for twenty years professor of medicine at Montpellier.

Here are his remarks "On the sting of the bee": "Bees and wasps have stings, and in the parts pricked there arise pain, swelling, and burning heat. Wasps do not leave their stings in the wound, but bees do, and live not long after. They rarely sting unless injured, and then they join together and help one

another, like an army. The king of the bees (*rex apum*) has no sting. And though they are bloodless animals, yet is their poison of a 'hot' character, wherefore cold things should be placed on the wound, such as iron, or lead cooled in vinegar, or mallow juice, or barley flour and coriander made into a paste with vinegar, or other cooling applications."

The following, says Gordon, is the best eye-salve which it had pleased God to reveal up to his day. Take of sileris montani (spindle tree?), marjoram, euphrasy, rue, celandine, fennel, each 3 oz.; zinzi (?) spikenard, long pepper, cloves, tuciæ extinctæ (?) sarcocolla in asses milk, lign-aloes, each 1 oz.; gall of eagle, hawk, and mountain goat, each 1 oz.; balsam, half an oz.; honey 1 oz. Mix, and allow it to digest in a hot sun forty days. It is of such virtue that it will enable an old man (*decrepitum*) to read small letters without spectacles (*sine ocularibus*). "Glasses called spectacles" (*vitrea vocata conspicilia*) are mentioned by Arnald of Villanova in his commentary on the Salernitan *Regimen Sanitatis*, written about the same time.

Gordon is the first to mention the modern form of truss. After reduction of the hernia, he says, let the patient wear a "brachale ferreum cum lingula ad modum semicirculi, et paratum sicut oportet," a passage which is transcribed without acknowledgment by John of Gaddesden. Though the mediæval physicians rarely experimented upon animals, they were sometimes able, thanks to the jurists and theologians, to make interesting observations on men. Thus Gordon remarks that when Jews are hung up by their feet, if you give them anything to drink, it will ascend to their stomachs, whence he concludes that that organ possesses a special attractive faculty.

The following were the eight diseases then recognised as contagious: "Febris acuta, phthisis, pedicon, scabies, sacer ignis, anthrax, lippa, lepra, nobis contagia præstant."

NOTES.

Gilbertus Anglicus, *Compendium Medicinæ*, Lyons, 1510; there is a good account of him in the *Histoire Littéraire de la France*, vol. xxii. John of Gaddesden, *Rosa Anglica*, Augsburg, 1595. Freind discusses him very fully in his *History of Physic*. For John of Arderne see *Arcæus*. *A Method of Curing Wounds*, by J. Read, London, 1588. Further extracts

may be found in South's *Craft of Surgery*, 1888, Daremberg *Histoire des Sciences Médicales*, i. 300, Malgaigne, introduction to his edition of *Ambrose Paré*. Bernardus de Gordonio, *Lilium Medicinæ*, Frankf., 1617. The impartial Haeser calls him a Scotchman in his larger, and a Frenchman in his smaller medical history, but see the *Histoire Littéraire de la France*, xxv

---

APPENDIX VI.

ANCIENT AND MEDIÆVAL MEDICAL PRESCRIPTIONS.

In describing ancient forms of medical treatment, even serious historians are apt to lay special stress upon methods which are strikingly superstitious, ludicrous, or disgusting, and this is, naturally, still more the case with popular writers. We are thus liable to make what is, perhaps, a somewhat unfair estimate of the medical skill of our ancestors, for though such methods were undoubtedly more prominent then than now, it would be a mistake to suppose that they were commonly employed by the better class of practitioners. The remedies mentioned in the following pages are, for the most part, standard prescriptions which are known to have been widely used, and they seem in many cases to have been well adapted for the objects in view, the chief objections, from our modern standpoint, being the number of the ingredients, and the largeness of the dose.

The first place must be given to the famous theriac, which had its origin in the universal antidote of Mithridates, and received its final form from Andromachus, archiater to the Emperor Nero, who added, among other things, what was considered its most valuable ingredient, viper's flesh. Space will not suffice for the entire prescription, but of the seventy-five substances included therein, the most important were opium, squills, castoreum, saffron, rhubarb, gentian, and ginger. It was used not only as an antidote to poisons, especially the bites of venomous beasts, but also to prevent and cure nearly all internal disorders. According to Galen it first became popular in Rome, under Marcus Aurelius, who took it regularly himself, and gave it to all his friends. He declares that its power to counteract the poison of

venomous animals is unquestionable, for "those who have the power of life and death have frequently tested it on condemned criminals, and always with success". He himself was unable to experiment with it on men, but tested it on cocks with the same result, the birds who had taken the theriac were unaffected by the bites of vipers, the others died. The drug was largely used throughout the middle ages, both among Arabs and Christians. We have seen the great Avenzoar applying it to the pimples on his nose, and the following is an interesting case of its use in the renaissance epoch, related by Thaddaeus Dunus (1523-1613): "We were sitting before the fire after dinner, when the nurse came and brought my wife the baby. When she pressed it to her as mothers do, she felt a prick like a needle in her left middle finger (for there was a scorpion in the baby's clothes). The pain and terror was so great that she nearly fainted, and almost dropped the baby in the fire, but the nurse ran up and caught it. As soon as she got up she fainted, and began to sweat, and to swell up so that she was well nigh suffocated. She made signs that I should loosen her dress, and then I saw the cause of the mischief, for the scorpion fell on the hearth. I ordered them to catch him, and then pounded him up into a plaster for the wound. Now, I had with me some excellent theriac, juicy and aromatic, which King Francis [I. of France] has had made for himself and his courtiers. I gave her a dose of this in wine, laid laurel leaves soaked in wine on the finger, and in two hours she was well. But if the scorpion had stung the baby there would have been no hope, so terrible and deadly is his poison." Its use survived even the overthrow of the Galenic system. "I have seen a dose of theriac given every day to all the patients in the hospital at Montpellier; while the lecture halls of that metropolis of medicine resounded with invectives against it," writes Bordeu in the middle of the last century. Bordeu himself is inclined to believe in it: "Old and experienced practitioners frequently use it, and not seldom successfully". As late as the close of the century, in some towns of France and Holland, the theriaca Andromachi was prepared annually with special formalities, in the presence of the mayor and town council.

Galen tells us that the first important narcotic compound

medicine was that called the Philonium from its inventor Philo, who lived B.C. 50, and wrote his prescription in a mythical poem which has been preserved, and of which the following is a condensed translation :—

I am the blessed invention of Philo, physician of Tarsus,
Bringing assistance to mortals tormented by countless diseases.
One dose will cure you of colic, dysuria or troublesome liver,
Shortness of breath, or the spleen, spasms, or pain in the side.
Does a man spit blood or vomit? I'll save him from death and destruction.
Coughs, indigestions, catarrhs or hiccoughs, I put them to flight all.
Writ for the wise alone, from the vulgar I fain would be hidden.
Take of the golden hair of the youth beloved of Hermes
Carefully so many drachms as equal the senses of mortals,
Add thereunto one drachm from Nauplius, Prince of Eubœa;
Thirdly, a drachm from the Trojan who slew the son of Menœtus,
Then throw in twice ten drachms of the berries white, shining and fiery;
Twice ten drachms of the beans devoured by Arcadia's monster,
A drachm of the root misnamed from Pisa in Jupiter's island;
Finally take ten drachms of "pium" with the article added,
Mixing the whole with the product well known to the offspring of Cecrops,
Made by the daughters of bulls; so taught me my fathers at Tricca.

Or in simpler language, saffron (crocus) 5 drachms, pyrethrum and euphorbium, each 1 drachm, white pepper and hyoscyamus, each 20 drachms, cretic nard 1 drachm, opium 10 drachms, attic honey a sufficiency. For an explanation of the allusions the reader may refer to Galen (xiii. 267) or the classical dictionary. This receipt was largely used throughout the middle ages, and most other prescriptions for pain, cough and sleeplessness were merely variations of it. Here for instance is a useful lozenge from a tenth century manuscript: "Myrrh 6 parts, frankincense 5 parts, opium, saffron, hyoscyamus, hound's tongue root, each 4 parts; to make 27 lozenges. They are good for coughs, toothache, colic and strangury. Give only to those you love."

The hound's tongue (*cynoglossa*) was accredited with specially sedative virtues, and was usually added to the opium and henbane (*hyoscyamus*) in mediæval narcotic pills. The following is the "pilula cynoglossæ" of the Salernitan pharmacopœia: ℞ cynoglossa, opium, henbane, of each 4 drachms, frankincense 5 drachms, myrrh, cloves, cinnamon, corymbus, each 2 drachms.

Make pills the size of a chick pea (*cicer*), five or six to be taken at bed-time for coughs and colds.

Passing from sedatives to digestives we may take the following interesting thirteenth century "dinner pills," from Arnald's *Breviarium* (see p. 200). "Pills I would not be without. Magister Campanus used them daily, taking two or three, the size of a chick pea. Aloes 4 parts, myrrh 2 parts, saffron 1 part." This is the famous Rufus' pill. According to Arnald's editor, Symphorian Champier, it was in common use in his time (sixteenth century) as a dinner pill, and it has survived in the *Pil. Aloes et myrrhæ* of our present pharmacopœia, undoubtedly the most ancient compound medicine now employed. "A powder which the Emperor Frederick II. had made by consultation of many learned physicians and philosophers, which he always took with his meals, and which is good against loss of memory by whatever humour produced, vertigo, blackness before the eyes, defects of sight, hearing, and other senses, and wonderfully comforts the 'ingenium': Caraway, anise, ameos, parsley, fennel, betony, cumin, calamint, mint, hyssop, spikenard, pepper, squinant (Scotch rush), each 1 drachm, marjoram, balsamita, basil, cardamom, galangale, liquorice, each 1½ drachms. Make a powder, which let every man take with his food if he wishes to experience the above benefits. It is to be hoped that this benefited the emperor's 'ingenium,' more than his body, for an Arab who saw him at Jerusalem, 1229, describes the "wonder of the world" as a miserable man, "bald headed, red haired, and weak eyed. Were he a slave he might sell for ten dirhams" (five shillings).

"Pills which Alexander, Pope and king (1254-61), used every day before and after meals. They are excellent for catarrhs, clear the sight, strengthen the hearing, expel superfluities, and can be taken without change of diet. Aromatic rush, cubebs, nutmeg, spikenard, epithyme (dodder?) carpobalsam, basil, mastich, asarum, cloves, of each 2 drachms, colocynth, 3 drachms, myrobalanus, chebulorum (?), emblicorum (?), rhubarb, each 2 drachms, agaricus, turbith, ½ drachm; add an equal quantity of aloes, and make pills the size of an orobus."

A favourite stomachic was the "confection of quinces" recommended by Montagnana against sea-sickness (p. 219). The

following was its composition. Take of quinces and honey, each 3 lbs.; vinegar 2 lbs.; boil them together and add, long pepper, ginger, cinnamon, each 1 oz., cloves, lign-aloes, each ½ oz., musk one scruple (from the Dispensarium of Nicholas Præpositus).

Purgatives have always been prominent among medicines; and the great mediæval purgative was the *pilula cochia* (either from cocca, pills or berries, as being the pills *par excellence*, or from the fact that cocca cnidia, the berries of a species of laurel, formed an important ingredient of the older varieties). The simplest form is the following given both by Mesuë the younger, and Nicholas Præpositus: "Take aloes, scammony, colocynth absinth, mastich, of each equal parts. Dose 1 drachm (!)." One would fancy that ancient drugs must have been very badly prepared, or that the *dura ilia* of our ancestors were far less sensitive than ours. We must conclude with a brief account of three interesting Paracelsic remedies, his laudanum, his opodeldoch and his stich (or wound) pflaster, whence probably our "sticking" plaster.

Eminent writers, *e.g.*, Browning in the notes to his well-known poem, speak as if there was no possible doubt that the laudanum of Paracelsus is the origin of our tincture of opium, and we sometimes find the amazing assertion that Paracelsus was "the discoverer of opium". It may be well therefore to repeat some of the facts which seem to indicate that the laudanum of Paracelsus, so far from being our laudanum, had nothing to do with opium at all. First with regard to the name. "Laudanum" is derived not from laudandum but from ladanon, a gum or balsam obtained from various species of cystus, still used in the East as a medicine and in the West as a perfume, and which mediæval writers call ladanum and laudanum indiscriminately. In later times the term was applied to other solids, even mineral (*e.g.*, corrosive sublimate), and it is not till the middle of the seventeenth century that we hear of "liquid laudanums," of which the most famous was that of Sydenham, consisting of opium with various aromatics dissolved in sherry wine. In imitation of this, numerous similar "laudana opiata" were composed in various countries, and at least one "laudanum sine opio" which contained antimony as its active ingredient. Paracelsus tells us that his laudanum was an arcanum unknown to his predecessors.

He did his best to conceal it from his successors, and his works offer no clue to its composition. Soon after his death, however, dictionaries explaining the hard words in his writings were published by two of his pupils Michael Toxites and Gerard Dorn. The former declares that the laudanum "is not opium, nor is it composed of puerile, poisonous, or narcotic drugs, but of all things best that earth possesses for the preservation of life, and especially of two things, than which none nobler can be found in the universe". The latter defines "laudanum" as "a medicine of Paracelsus composed of gold, corals and pearls. But the best evidence is that of his foremost disciple, Adam von Bodenstein, given in a Latin translation of his master's treatise *De Vita Longa*.

Since malicious persons have called the laudanum of Paracelsus a poison, he has determined (he says) to publish its full composition "for the benefit of good physicians, and that the bad may cease abusing what they do not understand". Paracelsus had two "laudanums" one of which he used for fevers, and the other for all desperate diseases. Here is the composition of the latter "gold leaf 1 oz., pearls ½ oz., flowers of antimony and asphaltum each 1 drachm, saffron 3 drachms, myrrh and aloes each 2 oz. Dose 4 to 10 grains. The other laudanum consisted of antimony, aloes, ambergris, saffron and sugar. The laudanum was certainly a solid, for Paracelsus gives it in pills which on one occasion he made up on the spot, according to Oporinus, with saliva. Willis attributes the origin of the liquid laudanum to Van Helmont, but there is no mention of it in the latter's works, and like the older Paracelsists he maintains that the genuine laudanum had no opium. Helmont relates marvellous cures which he has accomplished with this "laudanum verum absque opio; but like his predecessor omits to give its composition.

It is doubtful whether Paracelsus was the inventor of the "opodeldoch," for it appears also in the first German pharmacopœia, written by Valerius Cordus, and published after his death by the town council of Nuremberg (1543). It seems to have owed its name to its three principal constituents *opo*ponax b*del*lium, and aristo*loch*ia, for in one or two instances we find it termed opodelloch; and it has survived in a very much altered form to our own day. In the hands of Paracelsus and his

followers the opodeldoch developed into the stich-pflaster, which, though not to be found in full in any of the undoubtedly genuine treatises, was universally held by his disciples to be one of their master's most valuable inventions. "Its virtues (says Oswald Croll) are innumerable; there is nothing more efficacious on the sublunar globe." Felix Wurtz, who gives a very similar prescription under the heading "opodeldoch," is equally enthusiastic; and armed with it and the laudanum the average Paracelsist was perfectly prepared to cure all diseases, internal and external. Even the orthodox Fabricius Hildanus says that it is, no doubt, useful in some cases, but wisely adds that there are no such things as universal remedies, and we must always consider the individual patient, and the nature of the disorder. Here is the complete formula: "Take linseed and olive oil, of each 1½ lbs., wax and colophonium, each 1 lb., varnish (vernix), turpentine, oil of laurel, each ½ lb., minium, calamine, litharge of gold and silver, opoponax, galbanum, seraphinum, ammoniacum, bdellium, each 3 ozs., carabe citrini (amber?), frankincense, myrrh, aloes, aristolochia (*longa et rotunda*), mumia, magnet, hæmatite, each 1½ ozs., coral (red and white), mother of pearl, dragon's blood, terræ medicatæ strigensis (?) white vitriol, camphor, each 1 oz., flowers of antimony, iron rust (*croci martis*) each 2 ozs". This complex mixture has apparently been obtained by combining several prescriptions for wound salves given by Paracelsus in his *Great Surgery*, of which the following may serve as a specimen: "Take olive oil ½ lb., turpentine ¼ lb., flowers of St. John's wort to fill the measure, flowers of verbascum, one-third as many, rich white wine 1½ sextulæ. Heat till the wine disappears and expose in the sun. You will never use this balsam without wonderful success. The preparation of vernix (varnish) has revealed a marvellous remedy to the human race, especially with the addition of the above herbs, mastich, mumia, frankincense, and myrrh, also carabe. Fat and marrow, particularly that of human beings, are a wonderful improvement" (*Grosse Wundarztnei*, ii. 4).

For a full description of ancient pharmacy and materia medica see Berendes, *Die Pharmacie bei den alten Culturvölkern*, Halle 1892; and Peters *Aus pharmazeutischer Vorzeit*, 2 parts, Berlin, 1886-89, to which I am indebted for the story of Thaddæus Dunus.

APPENDIX VII.

THE ALLEGED VIVISECTION OF MEN IN THE SIXTEENTH CENTURY.

THE charge of vivisecting human beings, brought against some of the great anatomists of the sixteenth century, has been recently revived for controversial purposes, and it may therefore be worth while to examine the evidence upon which it is based. The accusation is made against three men, Berengar of Carpi, Vesalius, and Fallopius, in particular, and against the anatomists of the University of Pisa in general.

In the treatise *De Morbo Gallico*, attributed to Fallopius, it is said that Berengar of Carpi so hated the Spaniards that he shut up two of them, suffering from that disorder, intending to dissect them alive, for which thing he was expelled (from Bologna) and died at Ferrara (vivos anatomicis administrationibus destinaverit, qua de re profligatus Ferrariæ obiit). Later writers assert that he actually vivisected two Spaniards. The origin and refutation of this charge may probably be found in the preface to his *Commentary on the Anatomy of Mondino*. He begins by saying that his book is founded on observations both of the dead and the living, but he afterwards explains that by "the living" he means only patients whom he has treated surgically "for in our time we do not dissect the living, though much more might be learnt from them than from the dead, did we not desist from such a work because of its cruelty". The story is rejected by all modern historians (see Haeser, ii. 25).

The charge against Vesalius was made by his bitter enemies, the Galenists Dulaurent (1599) and Riolan (1624), more than a generation after his death, and the only instance they adduce is the famous case of the Spanish nobleman whom he dissected in the belief that he was dead; a story, which though not without some contemporary evidence, is, to say the least, extremely doubtful.

Fallopius is, or is believed to be, his own accuser. The following is from his *De Tumoribus*, cap. 14. "Fever resists 'cold' poisons, as I found at Pisa while anatomising a man. For the prince commands them to give us a man, whom we kill

in our fashion, and anatomise. To whom we gave two drachms of opium, and an attack of ague coming on (for he suffered from a quartan) prevented its action. He, delighted, requested a second dose, and that we should intercede for his pardon, if he survived it. We gave him another two drachms, when he had no attack, and he died." This is repeated in much the same language in his treatise on compound medicines, where, however, the dose is said to have been one instead of two drachms, and another criminal is mentioned who died seven hours after receiving one drachm. Both these treatises, however, were published after the death of their author, and are known to have been much corrupted.

Even should we admit the truth of all three of the above charges, there would still be no proof of deliberate vivisection, at least, so far as contemporary evidence is concerned. On the contrary, they would show that even the intention to vivisect human beings met with an immediate penalty, and that an unintentional vivisector would have been punished with death, had not his sentence been commuted to a pilgrimage by the powerful intercession of Philip II. In the case of Fallopius, we may regret that so amiable a man should have undertaken the office of an executioner, but there is a considerable difference between dissecting a criminal alive, and substituting the action of opium for some probably much more painful form of death.

The accusation against the Pisan anatomists is more serious, though, curiously enough, it is made not by contemporary writers, but by a jurist, Alphonso Andreozzi, more than three centuries after the supposed events. In a work, *On the Penal Laws of the Ancient Chinese*, the author remarks that, though Chinese punishments are often very atrocious, they may be paralleled by mediæval enactments, which, among other things, countenanced human vivisection. To support this he gives thirteen cases from the Florentine criminal archives, in which condemned prisoners are said to have been sent to Pisa for anatomical purposes. The following are the two first of these slightly condensed: "15th January, 1545. A woman, Santa, who had suffocated her two infants was condemned to be beheaded. Under the sentence is written: 'Dicta Santa, de mente Excellmi. Ducis, fuit missa Pisis ut de ea per doctores fieret notomia'." "17th December,

1547, Giulio Sanese, condemned to death, is to be taken to Pisa to be anatomised (ducatur Pisis pro faciendo de eo notomia)." The other cases are very similar; a criminal is sent to Pisa to the commissario, "who gave her as usual to the anatomist to make anatomy, as was done"; another was to have been sent to the commissario, and by him consigned to the anatomist "in what manner he chose, and at his good pleasure" (in quel modo che lo chiederà, e a suo beneplacito), but he was afterwards hanged instead. The series ends with the year 1570. In no case is there any notice of the execution of the criminals sent to Pisa, whence Andreozzi concludes that they were not executed at all, but vivisected by the anatomists. There seem, however, to be other ways of explaining the above extracts, for though we may admit that some of them have, at first sight, a very suspicious appearance, they nowhere assert that such vivisection actually happened.

Here is the decree of Duke Cosmo de Medici under which all this took place. "The inspection of the hidden parts of the human body is very useful and necessary to those who wish to attain the perfect art of healing. Wherefore, with a view to the benefit of the whole human race, we decree that the rector shall to the best of his ability provide every year, in winter time, two dead bodies (*cadavera*) for anatomy, one male and the other female, if they can conveniently be got, if not, at least one. And that this may be done more easily, we ordain that it shall be the duty of the commissario of Pisa, to consign to the rector the said dead bodies of any condemned criminals, according to all his requirement (ad omnem ejus requisitionem). But if there be no such criminal at Pisa in the anatomy season, then let the rector write to the "Eight" at Florence, to the end that the said cadavers may be conveniently procured. Provided always that no anatomy shall be done on the body of any citizen of Florence or Pisa, or of a doctor or scholar, unless with permission of their relations. Two students shall be elected, who have studied arts and medicine in some university for at least four years, and, if possible, have already seen anatomies. They shall preside over the dissection, provide everything necessary and confer with the rector and consiliarii as to the fees to be paid. None shall be admitted but matriculated scholars and doctors of one of our colleges. The rector and all M.D's. of the college, to-

gether with four poor scholars chosen by the rector and consiliarii, shall be admitted free." This edict seems to have been published about the end of 1544, and the resemblance of its terms to those of Andreozzi's extracts is obvious. The most noticeable point is that it asserts three times over that the dead body (cadaver) not the living criminal, is to be given to the university authorities. Now, there were two objects which the anatomists had specially in view: first, to get their subjects as fresh as possible, and, secondly, that the mode of execution should not injure any of the bodily structures. These were very good reasons why criminals condemned at Florence, should be sent alive to Pisa, and that they should be executed there in the manner recommended by the anatomists (in quel modo che lo chiederà), and the absence of any notice of such executions in the Florentine archives may be quite as well explained thus, as in the way suggested by Andreozzi.

We may go further and say that the former is far the more probable solution. During the period 1545-70 the chief teachers of anatomy at Pisa were (besides Fallopius) Realdus Columbus, and Vidus Vidius, both of whom express their utter abhorrence of human vivisection. According to the former, the criminality and impiety of such a practice could not fail to be obvious to a Christian physician (quod nefas atque impium Christiano medico non videri not posset. *De re Anat.*, 14, published 1559). Vidus Vidius, who was head of the medical faculty at Pisa for twenty years (1549-69), and physician to Duke Cosmo himself, is still more emphatic, and declares in language evidently based on that of Celsus that "it is too horrible, too inhumane, too cruel, to incise the members, and internal parts of living men, and to convert an art which is for the protection of mankind to the injury of any one, and that a most horrible injury, especially when the matters so sought after can be found in animals, which nature has, moreover, produced for the use of man" (*De Anat.*, i. 6.) Is it probable—I will not say that the above should have been written by men who were themselves notorious vivisectors of their fellows, for that is obviously absurd—that two Pisan professors should have so expressed themselves, if human vivisection had been regularly practised there, under the special sanction and encouragement of their own patron and benefactor, Cosmo de Medici? This may suffice to show that Andreozzi's inference, so far from being "be-

yond question," is, to say the least, very improbable; but we have still stronger evidence, which may possibly convince even those whose opinions on the matter are somewhat prejudiced. In 1545 Realdus Columbus was professor of anatomy at Pisa, and in the sixth book of his *De re Anatomica* he tells us that his researches on the uterine veins were made on the body of a woman whom he dissected in the public theatre before a great company of students and doctors: "Her name was Sancta, but should have been Demonica, for she had recently borne twins, which wretched infants she killed by suffocation, and was therefore condemned by just judges to be suffocated herself". In the first book he observes that: "A supernumerary rib was present in the body of a woman called Sancta, whom I dissected publicly in the theatre at Pisa, and afterwards made into a skeleton, now in the possession of my friend Bart. Stratensis, professor of medicine at Bologna. When it was on view, I remember that some *idiotæ* were ready to swear that that was the rib which women have more than men; but men and women have an equal number of ribs." We learn from his pupil Valverda that this dissection took place in 1545.

The matter is as plain as possible, Sancta is the Latinised form of Andreozzi's Santa, who, instead of being beheaded at Florence, was suffocated at Pisa by the judicial authorities. Columbus, knowing nothing of the original sentence, naturally concluded that this was the mode of death to which she had been condemned. Such alterations of the death sentence, to suit the convenience of the anatomists, had been made in earlier times. Thus the edict of King John I. of Aragon, in favour of the university of Lerida (1391), provides that once in three years a convicted criminal "notwithstanding any mode or form of death to which he may have been condemned for his crimes, shall, nevertheless, openly in the presence of all who wish to see him die, be judicially submerged in water by our appointed officers, till he is utterly suffocated". This, though repugnant to our modern ideas, was probably favourable for the criminals, for the average mediæval modes of execution were decidedly more painful than drowning.

To sum up: the condemned criminals sent to Pisa were usually executed there by the legal officers, probably by drowning or suffocation; there is strong, but not undoubted, evidence that

they were sometimes poisoned by the anatomists themselves; but there is not the slightest indication that any of them were vivisected, and the strongest possible evidence to the contrary.[1]

So far from being eager to vivisect condemned criminals, the early anatomists frequently saved their lives. Space confines us to the following well authenticated case extracted from the archives of the Medical Faculty of Vienna by Diomedes Cornarius: "In the year 1492, the body of Conrad Braitenauers, hanged for robbery, was given over to the medical faculty to be dissected. The physicians, noticing that there was still some vital spirit in him, at once bled him largely from both cephalic veins, and administered other restoratives. He was then seized with convulsions of the whole body, so that it took four strong men to hold him, lest he should kill himself over again, for he was quite out of his mind. He said afterwards that he could recollect nothing that had happened to him since he was in court. Finally he was sent in charge of the bedel to his home where this story was painted as a miracle. He is reported, however, to have been effectually hanged again for new thefts, thus verifying the vulgar saying: 'It is hard to drown what is due to the crows' (quod corvis debetur, vix submergitur)."

The only case of human vivisection for which there seems fairly good evidence is the following, taken from John of Troyes *Histoire de Louis XI.*, known for no very good reason as the "Chronique Scandaleuse": "In January, 1474, an archer of Meudon was condemned for many robberies, and especially for robbing the church at Meudon, to be hanged at Paris. He appealed to the Parlement which confirmed the sentence. Then the physicians and surgeons of the city represented to the king that many and divers persons were grievously molested and tormented by stone, colic, and pains in the side, with which the said archer was also much troubled, and that Monseigneur du Bouchaige (a favourite courtier mentioned by Comines) was sorely afflicted by the said maladies, and that it would be very useful to see the places where these maladies are concreted, and that this could be best done by vivisecting a human being, which

[1] I am indebted for part of the above to Roth's *Andreas Vesalius Bruxellensis*, Berlin, 1892, p. 473, etc., where the reader will find a more complete refutation of this calumny.

could be well effected on the person of the said archer, who was also about to suffer death. Which opening and incision was accordingly done on the body of the said archer, and the place of the said maladies having been sought out and examined, his bowels were replaced and he was sown up again. And by the king's command the wound was very well dressed, so that he was perfectly healed within a fortnight, and he received a free pardon, and some money was given him as well."

The effects of poisons and antidotes were very frequently tested upon condemned criminals, as is noticed in the text, and the following examples from Matthioli's notes to his edition of *Dioscorides* might be considerably added to if necessary. "In November, 1524, Pope Clement VII. ordered poison to be given to two condemned criminals in order to test the virtues of a wonderful oil invented by Gregory Caravita of Bologna, then my preceptor. Both received aconite; he who had taken the larger dose was rubbed with the oil and recovered after three days, though he had formidable symptoms; the other was left alone, and died miserably in a few hours, with all the symptoms, pains, and discomforts described by Avicenna." Matthioli then relates how he tested the same oil on a convict at Prague: "The man was delighted, for he said he would rather be poisoned in private, than hanged in public, and there was also the hope of escape. But he died in spite of the oil, and his face turned as blue as though he had been hanged. I also gave a drachm of aconitum napellus to a strong young robber, aged twenty-seven, in order to try the virtue of the bezoar stone of the Arabs. He said the poison tasted like pepper." Matthioli then gave him 7 grains of bezoar stone in wine, and after seven hours of very unpleasant symptoms, which are minutely described, he recovered.

NOTES.

For the supposed vivisection at Pisa see Andreozzi, *Le Leggi Penali degli Antichi Cinesi*, Florence, 1878; Cobbe, *Bernard's Martyrs*, 1879, and a pamphlet, *On the Vivisection of Men*, signed F. P. C., 1892; Berdoe, *Origin and Growth of the Healing Art*, 1893, p. 373. The edict of Duke Cosmo is given in Fabroni, *Historia Academiæ Pisanæ*, Pisa, 1791 (1-70). I have omitted a few immaterial sentences for the sake of brevity.

The Bezoar stone is a concretion found in the intestines of various

ruminant animals, especially the Bezoar goat (*Capra aegagrus*). It was introduced into medicine by the Arabs as a universal antidote. Ambrose Paré (*Des Venins*, 44), relates how it was tested by command of Charles IX. on a condemned criminal against a dose of corrosive sublimative. As in Matthioli's case the man was delighted, but he perished miserably; "so the king ordered the rest of the stone to be thrown into the fire, which was done".

In 763, Christinus, a renegade chief of Bulgarian brigands, was captured by the troops of Constantine V. "Having cut off his hands and feet, they brought in physicians who incised him alive from thorax to pubes, to study the structure of man; and so they burnt him." Theophanes, *Chronographia*, A.M., 6256; Paulus Diaconus, *Historia Miscella*, xxii. Here the vivisection seems to have been punitive rather than scientific, like the later drawing and quartering of traitors, but it was probably easier in that age to dissect a live apostate than a dead Christian.

INDEX.

INDEX OF PROPER NAMES.

Abælard, 385
Abano, Peter of, 201
Actuarius, 136
Aegidius, 189
Aesculapius, 39, 370
Aëtius, 129
Agamede, 39
Agnodice, 79
Albertus Magnus, 197, 267
Albucasis, 155
Alcmæon, 43
Alcuin, 181
Alexander of Tralles, 130
Ali Abbas, 150
Amatus Lusitanus, 277, 291
Amphiaraus, 41
Andromachus, 110, 403
Anel, 348
Angelus, 238
Antyllus, 93
Apuleius, 177
Arantius, 275
Archagathus, 82
Archigenes, 92
Archimatthæus, 229
Archimedes, 64
Arderne, John of, 400
Aretæus, 128
Argæus, 75
Aristotle, 68
Arnald of Villanova, 197, 206
Asclepiades, 83
Aselli, 300
Asoka, 30
Athothis, 19
Auenbrugger, 357
Avenzoar, 157, 167
Averroes, 160, 267
Avicenna, 151

Bachtischuas, the, 139, 171
Bacon, F., 57, 309
Bacon, R., 197
Baglivi, 321
Barthez, 338
Barry, 318
Basil, St., 120
Basil Valentine, 252, 269
Bell, B., 350
Bellini, 317
Benivieni, 244, 290
Benedict, A., 280
Benedict, St., 380
Berengar of Carpi, 274, 410
Bernard of Gordon, 401
Bernard of Provence, 189
Bernard, St., 180, 232
Bertharius, 379
Bichat, 358
Boerhaave, 324
Bordeu, 345, 404
Borelli, 315
Brassavola, 282
Brissot, 247
Brown, 345, 351
Bruno, 207
Buddhadasa, 31

Cælius Aurelianus, 52, 60, 88
Caius, 246
Canani, 276
Callisthenes, 73
Cardan, 251, 270
Cato, 81

Celsus, 90, 246
Charaka, 26, 147
Charlemagne, 182
Charmis, 105
Charondas, 44
Cheselden, 349
Chopart, 349
Chrysippus, 63
Colnet, 223
Columbus, 275, 413
Constantine, 187
Copho, 186
Cordus, 295, 408
Corvisart, 358
Ctesias, 53
Cullen, 345
Cyrus and John, SS., 123

Demetrius, 136
Democedes, 43
Demosthenes, 107
Desault, 349
Descartes, 309
Desiderius, 380
Dhanvantari, 26
Diagoras, 66
Diaulus, 109
Digby, 273
Diocles, 60
Draco, 58
Duttha Gamani, 30

Empedocles, 45
Ephrem, St., 120
Erasistratus, 62
Etienne, 276
Euryphon, 52
Eustachius, 275, 277
Evenor, 75

Fabiola, 119
Fabricius, J., 275, 278
Fabricius, W., 271, 286
Fallopius, 275, 277, 281, 410
Foësius, 246
Forest, 295
Franco, 285

Gaddesden, 398
Galen, 10, 95-104, 386
Galileo, 309, 315
Gariopontus, 186
Gentilis, 218
Gimbernat, 351
Glaucias, 73
Glisson, 343
Gordon, Bernard of, 401
Günther, 216

Hahnemann, 89, 266, 342
Haller, 344
Haly Abbas, 150
Hans of Dokenburg, 227
Harets, 139
Harvey, 299
Hawkins, 349
Heister, 351
Heliodorus, 91
Helmont, van, 272, 299, 303
Heloissa, 385
Henry of Mondeville, 180, 212, 236
Heracleides, 66
Herodicus, 35
Herophilus, 61
Hildegard, St. 242, 267
Hippocrates, 47, 100
Hoffmann, 327
Homer, 37
Honain, 141, 386
Hugh of Lucca, 208
Hunter, 350
Hwang-ti, 363
Hwa-tho, 368

Ingrassias, 275
Isaac Judæus, 148

John XXI., Pope, 204
Joyliffe, 303

Kaye, 246
Keill, 318

Laennec, 358
Lancisi, 356
Lanfranc, 211

Lange, 251, 290
Leonicenus, 246
Leeuwenhoek, 302
Libavius, 270
Linacre, 246
Lowdham, 350
Lower, 302
Luke, St., 107

Machaon, 39
Maimonides, 161
Malpighi, 301
Marcellinus, 105
Marcellus, 117
Marchettis, 329
Marinus, 96
Massa, 282
Matthioli, 291, 416
Mayow, 302
Mead, 104
Menocritus, 75
Mesue I., 141
Mesue II., 174
Mithridates, 58
Mondeville, Henry of, 180, 212, 236
Mondino, 216, 273
Montagnana, 219
Morestede, 223
Morgagni, 356
Moschion, 88
Myrepsus, 135

Nebsecht, 17
Nechepsus, 20, 158
Nicetas, 135
Nicomedes, 76
Numa, 81

Onasilos, 71
Oribasius, 129, 225
Ormuzd, 55

Paracelsus, 254-269, 408
Parakkama, 31
Paré, 284
Park, 351
Pasicrates, 64
Paulus Æginetæ, 130
Pausanias, 45, 73, 370
Pecquet, 301
Petit, 348
Pheidias, 77
Philinus, 68
Philip, 73
Pitcairne, 317
Placitus, 177
Platearius, J., 186
Platearius, M., 187
Plato, 58
Pliny, 61, 80, 176
Pliny Valerianus, 176
Podalirius, 39, 45, 47
Polybus, 59
Porta, Baptista, 270
Posthius, 278
Pott, 350
Præpositus, 188, 407
Praxagoras, 60
Priscian, 113, 176
Ptolemy, 61
Psellus, 135, 137
Pythagoras, 42

Rabboula, 125
Rafn, 222
Reil, 346
Rhazes, 94, 145
Roger, 207
Roland, 207, 228
Rondelet, 276
Rudbeck, 301
Rufus, 96, 406

Saliceto, 211
Sanctorius, 315
Satyrus, 76
Scribonius Largus, 113
Scarpa, 351
Scultetus, 331
Sechetenanch, 14, 24
Serapion, 68
Serenus, 176
Servetus, 278
Seth, 135
Sichelgaita, 194

Sinan, 144, 153, 163
Soranus, 88
Stahl, 334
Stephania, 194
Susruta, 26, 33
Sydenham, 49, 319
Sylvius I., 276
Sylvius II., 310
Symmachus, 109

Tagliacozzi, 285
Themison, 85
Theodoric, 210
Theophanes, 134
Theophilus, 131
Thessalus I., 58
Thessalus II., 87
Thrita, 36
Trotula, 192
Tulp, 332

Valeria, 113
Van Helmont, 272, 299, 303
Varolius, 275, 280
Vesalius, 274, 277, 410
Vicary, 275
Vidius, 276, 413
Vigo, 249

Walafrid, 181, 184
Wang-Shu, 363
Weyer, 250
White, 351
Whytt, 344
Willis, 313
Wirsung, 302
Wiseman, 329

Xenophon, 105, 110

Zaleucus, 45
Zedikiah, 238
Zerbi, Gabriel of, 231

LANE MEDICAL LIBRARY
300 PASTEUR DRIVE
PALO ALTO, CALIFORNIA 94304
Ignorance of Library's rules does not exempt violators from penalties.

OCT 24 1968
DEC 27 1971
MAR 28 1975
APR 15 1975
DEC 17 1975

50M-10-63-5632

17628
F
131
.L82
1894
LANE
HIST